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ORIGINAL MEMOIRS.

LARGE INTRATHORACIC CYSTS OF THE THYROID GLAND CAUSING DYSPNŒA.*

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NUMEROUS cases have been reported during the last sixty years of the development of goitre situated partially or completely within the thorax and causing dyspnœa by pressure on the trachea.

The cases of Bonnet,¹ of Lyons, were reported in an article on "The Goitres that Compress and Deform the Trachea," in 1851.

In 1879 Malard² took for the subject of his thesis "The Clinical Studies of Diving or Retrosternal Goitre."

Wührmann³ in 1896 collected the reports of ninety cases of intrathoracic goitre, and made a thorough study of the whole subject. His cases included cystic goitre, solid goitre, and carcinomata developed in intrathoracic thyroid glands.

The title of the thesis of Cadet, written in 1905, is "Endothoracic Goitre," and the work is devoted to diving goitre and to intrathoracic accessory goitres.

Among these reports are a few cases of large intrathoracic cysts developed in misplaced thyroid glands, and having had an opportunity recently of operating on a patient suffering from a similar lesion, I have thought it sufficiently interesting to report this case, to give abstracts of the reported cases of like

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nature, to call attention to the anatomical characteristics and the very striking clinical picture.

CASE I.—A. M., a native of the United States, twenty-one years old, printer by occupation, was admitted to Saint Luke's Hospital in the service of Dr. Hollis, on September 27, 1910. He was suffering from cough, headache, and difficulty in breathing. He said that for the past four years he had been very susceptible to attacks of bronchitis, the slightest exposure to cold or wet causing an attack. For the past two years he had been short of breath on exertion, such as going upstairs or walking up hill.

About a year and a half ago, while dressing in front of a mirror, he chanced to cough, and to his surprise saw a swelling rise above the right clavicle and then disappear. Each time he coughed the tumor appeared. He was stout and in good health, weighing 170 pounds, and except for the shortness of breath and slight headache from time to time, felt well.

He next noticed that his neck was increasing in size. He changed the size of collar from 14 to 14½, then to 15.

During the following year he had two severe attacks of bronchitis, with dyspnoea, wheezing, a persistent cough, and profuse mucopurulent expectoration. Since the last attack he had had increasing difficulty in breathing, and was blue and breathless after even moderate exertion. He was told by his friends that his voice had become harsher. The swelling in his neck increased. He now found it necessary to wear a 16 collar. The protrusion above the clavicle on coughing was more pronounced. He had consulted a number of physicians, and was told that he had a hernia of the trachea, and that this hernial protrusion filled up from time to time with mucopurulent material from the trachea and bronchi.

The present attack for which he was admitted to the hospital was similar to the others but more severe. The cough, dyspnoea, mucopurulent expectoration, and the wheezing were all present.

At no time had he had difficulty in swallowing, nor had he coughed up blood. There had been no soreness or pain connected with the swelling in his neck.

He had had the usual diseases of childhood and had had adenoids removed from his nasopharynx two years ago. Otherwise he had always been in good health.

On examination of his neck, a slight swelling was seen extending from the middle of the right clavicle across the middle line, filling up the episternal notch. On coughing, it grew suddenly much larger and then as suddenly receded again behind the clavicle. The top of the swelling was dome shaped and gave the impression that it extended behind the clavicle and sternum. It did not pulsate.

The swelling seemed to move with the movements of the trachea to some extent, moving up and down slightly on swallowing. The veins on the right side of the neck were engorged, the external jugular stood out as large as the little finger; the veins of the right side of the chest were also engorged. The throat appeared normal. The right pupil was slightly smaller than the left. There were numerous râles to be heard over both lungs, and the respiratory murmurs were harsher than normal. The heart was normal, the pulse regular and of good force, about 140, the respirations 30 to the minute, noisy and wheezing in character. There was moderate cyanosis. The temperature was 103.8°. The leucocyte count showed 16,900 white blood-cells, of which 78 per cent. were polymorphonuclears. The sputum showed the prevailing organisms to be a diplococcus resembling the pneumococcus.

During the next ten days the patient grew gradually worse, the dyspnoea became so severe that he was unable to lie down, the cyanosis and engorgement of the veins were more pronounced; his evening temperature varied between 104° and 105°; the cough and expectoration were very troublesome; he seemed to be losing flesh and strength rapidly, and was in a pitiable condition.

He was then transferred to the surgical division. The following night he seemed a little less uncomfortable but soon all his old symptoms reappeared. From the position of the swelling in its relation to the trachea, it seemed probable that he was suffering from an intrathoracic goitre, which was compressing the trachea and causing the dyspnoea, and it was obvious that unless he were speedily relieved he had not long to live.

Accordingly, under chloroform anæsthesia, a transverse incision about one inch above the clavicle was made across the neck, dividing the skin and platysma. The sternohyoid and sternothyroid were severed, and the sternomastoid strongly retracted. The dissection was carried upward and the superior

thyroid vessels ligated. The bleeding was very profuse from the engorged veins. Blunt dissection soon exposed the bluish wall of a cyst, covered by a thin mantle of thyroid tissue. The patient at this time was taking his anæsthetic badly, and the cyanosis was alarming. The cyst was punctured, allowing about half a pint of thin watery fluid to escape. The dyspnoea was immediately relieved. A Kocher clamp was then placed on the opening in the cyst wall and an attempt made to continue the enucleation. It soon became apparent that this was impossible, as the cyst extended far down behind the sternum and sternal end of the clavicle into the thorax. The upper free portion of the cyst wall was therefore removed, allowing again about half a pint of watery fluid to escape, and a soft drainage tube and a wick of gauze were inserted into the intrathoracic portion. The muscle and skin were then sutured, except for a small aperture for the passage of the tube. The cyst wall was extremely thin.

The duration of the operation was thirty minutes. The patient returned to the ward in good condition, the cyanosis had disappeared, and the respiration was no longer labored.

For several days the bronchitis continued. The temperature on the evening of the fourth day was 104° ; on the seventh day, however, it was 99.8° in the evening and from that time on he continued to improve. He weighed at this time 115 pounds, having lost during his illness 52 pounds.

During this week the dressing was saturated with thin serous discharge. The drainage tube was removed on the fifteenth day, the discharge having become much less, and he left the hospital on the twenty-second day with a small discharging sinus in the neck. He had gained in the three weeks 13 pounds, the temperature was normal, the pulse 108, respirations 24. During the next two weeks he was seen twice a week, and the sinus cauterized with 95 per cent. carbolic acid from time to time, a long probe being used as an applicator. It passed behind the sternum for several inches. At the end of this time the sinus closed, and he returned to his work. He now weighs 150 pounds, and is in good health.

CASE II (Reported by ANTHONY BOWLBY*).—A woman, thirty-four years old, was admitted to St. Bartholomew's Hospital, suffering from difficulty in breathing. She said that two years previously she first noticed a soft swelling in the episternal notch in the middle line of the neck, and that it had increased steadily and spread a little to each side.

Ever since the swelling began she had suffered from shortness of breath, and during the last six months had had occasional attacks of transient but severe dyspnea. On admission she was suffering from such an attack, temperature was 103° , respirations 50, pulse 150.

Examination of the neck showed at first very little swelling. Such swelling as there was occupied the episternal notch and caused a prominence in this region instead of a depression, and extended laterally under each sternomastoid. When the patient coughed, however, the swelling increased in the most extraordinary manner, and a large rounded mass was suddenly extruded from the chest into the neck and then as suddenly disappeared. The way in which the tumor was projected reminded one much of the sudden protrusion of a large inguinal hernia during coughing. To the touch the swelling was smooth, rounded, and curiously soft. The tumor seemed to move very little on deglutition. An examination of the chest revealed a large area of dullness behind the sternum and cartilages of the first, second, and third ribs, and continuous with normal cardiac dullness. There were loud mucous râles in the trachea and bronchi.

At the operation a large cyst was exposed in the left lateral lobe of the thyroid. The cyst wall was exceedingly thin and extended behind the sternum beyond view. The cyst wall was incised; it contained about a pint of clear, almost watery fluid. "It had displaced the apices of the lungs laterally and extended down to the base of the heart. Its thin walls were reflected over the large vessels, so that on looking into the cavity one saw innominate, carotid, and subclavian arteries. The arch of the aorta was similarly prominent, part of the cyst passing in front of it and part behind, the floor of the cyst rested on the base of the heart, the pulsation of which could be easily seen." The walls were stitched to the skin around the episternal notch.

The patient made an almost uninterrupted recovery. The bronchitis persisted for a few days. The opening in the cyst closed in three weeks. There was no sign of refilling of the cyst. The case was reported in April, 1895. The case entered the hospital in December, 1892.

CASE III (Reported by BOUTARESCO³).—A woman, forty-six years old, married, was admitted to the hospital for an enormous tumor of the neck. She complained of oppression, tired easily, the breathing was short and insufficient. Her voice was hoarse, weak, and hardly understandable. She had pain in the right arm but no motor symptoms. The patient's condition was one of great weakness.

She presented two voluminous tumors of the neck. One occupied the anterior region, and extended from the hyoid bone to the sternum, behind which it disappeared, and between the two sternomastoid muscles. The second occupied the right supraclavicular hollow. The trachea and larynx were pushed strongly to the left. These tumors fluctuated. On puncture a brownish fluid was withdrawn.

In the first operation the lateral tumor in the supraclavicular fossa was removed; one portion of it was adherent to the pleura. At the end of the operation Boutaresco was not a little surprised to discover that there was not only no communication between the two tumors but that

they were separated by the carotid sheath. Seven months later the patient's condition continuing the same, Boutaresco proceeded to extirpate the median tumor. After exposure of the cyst wall, 300-400 c.c. was taken away with a Dieulafoy syringe. It soon became evident, as the dissection proceeded, that the tumor, instead of stopping at the episternal notch, extended far into the mediastinum behind the sternum, making it impossible to complete the enucleation of the cyst. The remaining portion of the contents of the cyst were withdrawn, the cyst wall widely opened, and the hand introduced to determine its relation. Much to his surprise the hand passed behind the aorta and heart, whose pulsation could easily be felt. Anteriorly the cyst wall followed the posterior surface of the sternum to the fourth costosternal articulation. The portion of the cyst in the neck was excised. The intrathoracic portion was drained after suturing it anteriorly to the margin of the wound. The patient made a good recovery. In two months the sinus had closed.

CASE IV (Reported by DEMME⁶).—A man, sixty years old, was admitted to the medical service of Würzburger Hospital suffering from difficulty in breathing. For some years he had been suffering from shortness of breath, transitory attacks of asthma, and violent fits of coughing.

His neck was short and thick. There was a moderate-sized goitre springing from the isthmus of the thyroid and passing beneath the sternum, under which it seemed to be drawn. This goitre decreased in size under treatment with potassium iodide, but the difficulty in breathing increased and he died in a few days.

At autopsy no goitre was visible above the sternum. The veins of the neck were moderately filled and dilated. The trachea and larynx were not displaced; the goitre of the isthmus, felt on admission to the hospital, had contracted down to a mass about the size of a hazel-nut, surrounded by connective tissue and situated on the trachea.

On removal of the sternum a large cystic goitre appeared. It extended on the left side from the third or fourth tracheal ring to the bifurcation. It was flask shaped. The neck-like narrowing, about 2.5 cm. in diameter, extended into the opening of the thorax. It was covered by the hypertrophied sternohyoid and sternothyroid muscles. The large vessels and nerves of the neck were not displaced. Immediately beneath the sternoclavicular joint and the sternal notch the cyst widened and soon reached a diameter of 7.5-8 cm. The anterior wall lay in immediate contact with the ribs and sternum, without being adherent. Its length was 12.5 to 13 cm. The base of the sac rested on the great vessels, but the arch of the aorta was not compressed. The innominate and subclavian veins, on the contrary, were narrowed and empty centrally, dilated and overfilled peripherally. The left upper lobe of the lung was compressed. The trachea was distinctly compressed from the fourth to the fifth cartilaginous ring to the bifurcation, in the upper part more laterally, from the sternal notch, however, from before backward; the narrowest point was at the first rib. The left bronchus was pale and discolored but not compressed.

The cyst wall was 4-5 mm. thick, and fibrous. The contents consisted of a purulent-like material composed of broken-down blood and colloid.

The tracheal and bronchial mucosa was loosened, reddened, and covered with mucus. These alterations were most marked below the narrowed portion.

CASE V (Reported by PROUST¹).—The patient was thirty-five years old. He complained of shortness of breath and the presence of a tumor in the neck.

The tumor lay beneath the sternomastoid and was of oval form. It extended from two fingers' breadth below the jaw to the clavicle, beneath which it seemed to pass. The superficial veins were enormously dilated. The tumor was movable laterally. It showed no pulsation, but was thrown up and down by coughing. It did not move on swallowing. Pressure over the tumor caused the patient to cough. It distinctly fluctuated. There was no difficulty in swallowing. The left carotid pulse could not be felt. When pressure was made gradually on the tumor it disappeared almost entirely. When the pressure was removed it slowly returned. The radial pulse was small and irregular. The patient gradually lost flesh and strength, and in about one month died.

At autopsy a spherical tumor was found. It extended beneath the left sternoclavicular articulation into the thorax to the second intercostal space, showing that the disappearance of the tumor on pressure had been due to its being pushed farther down into the thorax. It was about as large as the fist, and was formed from the left lobe of the thyroid and directly attached to the trachea. The trachea was considerably displaced but not narrowed.

CASE VI (Reported by DITTRICH⁶).—The clinical characteristics of this case had been reported by Singer two years previously. He suggested at that time as the most probable diagnosis a fibroma, which had its origin in the lung or pleura.

The patient had been under observation during the interval and had been admitted to the hospital at Prague for violent coughing attacks and hæmoptysis. At no time had there been any manifestation which would have suggested a connection between the tumor and the thyroid, such as a protrusion in the supraclavicular region, or a palpable connection between the tumor and the thyroid region.

The patient was a woman of sixty years, suffering from difficulty in breathing. There was a dulness on percussion over the upper part of the right side of the thorax. There was also enormous dilatation of the superficial veins in the region of the upper aperture of the thorax. There was absence of the pulse in the right carotid, and moderate widening of the right pupil. During her entire illness she had had attacks of bleeding from the lungs, and she died from such an attack.

At autopsy, on opening the chest, a tumor the size of a man's head presented, which occupied nearly the entire half of the thorax. It was a long oval mass, having an upper and a lower pole. Its surface was smooth. At only one point on the level of the first rib on the forward and outer part was there any attachment to the thoracic wall. The pleura

invested the tumor, being inverted by it, and was readily separated from it. Over the forward and upper pole ran the innominate artery and the right subclavian vein.

At the upper pole of the tumor was a reddish-brown mass which extended to the height of the third tracheal cartilage. This mass was gradually lost on the surface of the tumor as it passed downward, making a mantle-like covering. Above the third tracheal cartilage there was no thyroid tissue. On the left side was a well-developed lobe of the thyroid, reaching as high as the middle of the left side of the thyroid cartilage. Section of cyst showed that walls were about 5 mm. thick. It contained about three litres of a moderately thick, yellowish-brown fluid. Microscopic section showed the mass at the upper pole of the tumor to be made up of thyroid tissue. The isthmus of the thyroid had entirely disappeared.

The right lung lay compressed along the medial side of the lower part of the cyst.

The trachea was pushed to a moderate extent to the left along its entire length, and the right main bronchus seemed also pushed to the left and flattened. The mucosa of the latter was ulcerated throughout its entire extent. Examination for tubercle bacilli in the neighborhood of the ulceration gave negative result.

CASE VII (Reported by WÖLFLE⁹).—The patient was a man of twenty-six years. On the left side was a cystic goitre. On opening the cyst the finger passed into a large cavity which extended from the cricoid to far down beneath the sternum.

Anatomical Considerations.—The isthmus of the thyroid usually lies in contact with the three or four upper rings of the trachea. The entire thyroid may, however, be situated much lower, the isthmus reaching the sixth tracheal ring, and Nuhn¹⁰ observed a thyroid, otherwise normal, where the narrow isthmus lay behind the sternum, the left lobe was almost entirely behind the sternal portion of the sternocleidomastoid muscle; the right, more deeply placed, reached the upper border of the arch of the aorta, and its blunt end completely filled the angle between the innominate and left carotid artery.

In certain instances the neck is short, the larynx low, and the isthmus and lateral lobes are situated partly within the thorax. Kocher¹¹ calls this condition thyreoptosis.

An accessory thyroid gland may exist below the thyroid, within the thorax.

In any of these anatomical conditions a goitre developing within the gland may be situated partially or wholly within the chest. But in many instances the development of a retro-

sternal goitre seems to be due less to the deep position of the thyroid than to the circumstance that adenomatous material begins to grow from the lower border toward the retrosternal or retroclavicular space. The prolongation preserves a broad connection with the portion of gland from which it is derived, or the pedicle gradually stretches until it is reduced to some vessels and a layer of connective tissue, more or less thick, the vestige of the capsule. This extension is aided according to Kocher¹² by two circumstances: first, the gland has a tendency to be sucked into the thorax during inspiration; second, the gland is forced into the thorax when the head is inclined forward.

Wührmann³ found that the development of intrathoracic goitre from an accessory thyroid gland was exceptional. It occurred five times in his series of ninety cases.

A normal thyroid or a small goitre situated at the upper opening of the thorax can move up and down, lying now above and again below the aperture. As a goitre increases in size this excursion becomes less easy, and it may be caught below the opening and no longer be able to emerge in the neck, or certain manipulation, such as extending the neck or pulling on the pedicle, may be necessary to release it. The cases reported by Malard and by Bonnet are of this character. In most instances the goitre did not exceed in size a hen's egg. The incarceration of such small goitres may be followed by fatal results from pressure on the trachea, and the French writers of thirty or forty years ago drew attention to the disproportion between the size of goitre and the seriousness of the symptoms. Goitres which are freely movable, being at times intrathoracic and at times above the sternum, are called diving goitres (*goitre plongeant*).

On the other hand the goitre may pass within the thorax and continue to grow, causing for a long time few pressure symptoms, and being visible above the thoracic opening only during forced respiration, deglutition, and above all during coughing, or there is no evidence of a swelling above the clavicle or sternum. In this class belong the cases I have reported.

Symptoms.—The patient is as a rule an adult, and his chief

complaint is dyspnoea, at first noticed only after exertion, such as walking rapidly or going upstairs. It is progressive. He is very susceptible to attacks of bronchitis, and during these attacks the dyspnoea becomes much worse. The expectoration may be very profuse. There are wheezing and a very troublesome and persistent cough. The dyspnoea may be so severe that the patient is unable to lie down, sitting up all night in an arm chair like an asthmatic. There is little or no difficulty in swallowing. The voice is often harsh. The pupil on one side may be dilated. The patient gradually loses flesh and strength. The process in these large cysts is very slow, years not months intervening between the first symptoms and attacks demanding immediate relief.

There may be dulness on percussion over the upper part of the chest, extending at times to the third or even fourth space. The veins of the neck and chest are engorged. The carotid pulse may be absent. There may be abnormal sensations in the arm. On careful palpation of the trachea it is found to deviate from the middle line. In most instances a rounded mass can be felt above the sternum. It is smooth, compressible, and fluctuates. Coughing causes it to become suddenly prominent, suggesting the appearance, as mentioned by Bowlby,⁴ of an inguinal hernia when it is protruded by coughing. The mass may pulsate, but the pulsation is not expansile, and usually there is no murmur heard. By direct examination with the tracheoscope,^{13 14} one should be able to see the narrowing of the trachea, and the examination by the X-ray might be of great value.¹⁵

Diagnosis.—The symptoms recounted—cough and dyspnoea from pressure on the trachea or bronchi, paralysis of the recurrent laryngeal, widening of the pupil from pressure on the ocular pupillary fibres of the sympathetic, dilatation of the veins of the neck, weakness or absence of the carotid or radial pulse, and dulness over the upper part of the chest—obviously might be caused by any mediastinal growth, whether it be hypertrophy of the thymus, enlargement of the tracheobronchial lymph-glands, aneurism of the aorta, or new growths or cysts arising in one of the mediastinal structures.

If, however, these pressure symptoms are present, and at the same time a tumor can be palpated in the neck just above the sternal notch or clavicle, and if above all it increases suddenly on coughing or moves with swallowing, then the diagnosis of an intrathoracic goitre should be made. If the symptoms have developed very slowly and if the tumor is soft and fluctuating, then a cyst of such an intrathoracic goitre should be present.

In the case reported by Dittrich no tumor appeared in the neck, and during life the diagnosis was not made.

Hypertrophy of the thymus occurs during the earlier years of life. In enlargement of the tracheobronchial lymph-glands there are usually other glands to be felt in the neck. Aneurisms of the aorta give usually expansive pulsation, a thrill, and a double murmur. They may push out the wall of the chest and be seen and felt to pulsate. In absence of physical signs the shadow cast by the X-ray may be of service.

Malignant growths, whether they spring from the lymph-glands, mediastinal tissue, or thyroid gland abnormally placed, all cause by their rapid growth a correspondingly rapid evolution of the symptoms related, in marked contrast to the slow unfolding of the symptoms of a cyst. With ecchinococcus cysts and dermoid cysts, in the absence of a palpable tumor, the differentiation would be impossible. Dermoids which have ruptured into a bronchus have been diagnosed by the coughing up of hair, and attacks of urticaria might make one think of an ecchinococcus cyst.¹⁶

The sudden appearance of a swelling in the neck after coughing, the softness of the tumor, and the attacks of dyspnoea might lead to the diagnosis of an aërocele, that is hernia of the mucosa of the trachea. But aërocele should give the physical signs of a tumor filled with air, not watery fluid, nor should there be present the signs of a mediastinal tumor causing pressure.¹⁷

Treatment.—No attempt has been made in any of these large cysts to remove the cyst wall of the intrathoracic portion. Such an attempt would be hazardous.

Yet in the case reported by Dittrich, although the cyst was

so extensive, at autopsy it was found adherent only to the chest wall at one point.

The cyst has usually been opened, the cyst wall sutured to the margin of the skin wound and drained. The cysts have not refilled after this simple treatment, the sinuses closing within two or three months.

In 1901 Kocher¹¹ reported twenty-two cases of intrathoracic goitre in which the goitre had been enucleated. He had had no fatalities. They were enucleated or, where this was impossible, removed piecemeal by the finger working inside the capsule of the gland, thus opening cysts or even abscesses. He does not speak of large single intrathoracic cysts.

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FURTHER EXPERIENCES WITH ANÆSTHESIA BY THE INTRATRACHEAL INSUFFLATION OF AIR AND ETHER.

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IN previous papers I have reported upon the technic of insufflation anæsthesia, and have described a simple and easily portable apparatus for intratracheal insufflation in man. As it is important to fully understand this new method of anæsthesia, whose great value for intrathoracic surgery is undoubted, I deem it of importance to report upon the additional experiences we have had with the method from the stand-point of the anæsthesia, and to leave to a later publication the experiences that I have had with the method in operations upon the thorax.

Up to the present time, we have anæsthetized almost 100 patients by the insufflation of air and ether, and we have made some observations which shall be briefly reported in what follows.

REGARDING THE TECHNIC OF INTRATRACHEAL INSUFFLATION.

The following remarks are supplementary to the detailed description of the technic given in the *ANNALS OF SURGERY* for February, 1911.

It is always advisable to anæsthetize the patient in the ordinary way by inhalation, before the intratracheal tube is introduced, because it is unpleasant for the patient to have the tube inserted into the trachea while he is conscious. Besides, the beginning of insufflation of the air and ether mixture while the patient is conscious is almost certain to cause a good deal of spasmodic coughing. It is also advisable to give the patient a small hypodermic injection of morphine before the operation, so as to diminish the reflex irritability of the larynx.

In the majority of adult patients a catheter No. 24 French is of the proper size, and exact estimations to determine the best size of catheter to be selected (as described in my previous paper) are unnecessary.

The animal experiments of Meltzer and Auer, and our own, have demonstrated that the anæsthesia is without danger in dogs. Every experimenter knows how easy it is to kill a dog with ether given by inhalation. When the ether is given by intratracheal insufflation, however, it is impossible to kill the animal, and the animals can be kept under the effects of the anæsthetic for many hours without danger. Our experiences in the human being have also been very satisfactory; we have found that the patients stand the anæsthetic remarkably well. They are never too deeply under the anæsthetic; in no instance did we observe a dilatation of the pupils as an evidence of too deep an anæsthesia. From our experience thus far, it seems that it is impossible to give a patient too much ether by insufflation by means of our apparatus. If the full amount of ether possible is insufflated, it means that more ether escapes by the side of the intratracheal tube and out of the larynx and mouth. Complete relaxation is usually obtained with 50 to 75 per cent. of ether (according to the scale). The anæsthetizer must, however, be on the lookout that the patient does not begin to react unless full ether is used all of the time.

We have found that the patient who is beginning to react can very quickly be brought under full anæsthesia again by turning on full ether (100 per cent. of the scale) and by raising the pressure to 40 mm. of mercury for a few moments. In other words, if, during the course of an operation, the patient begins to react, the anæsthetizer should turn the ether indicator to 100 per cent. and raise the pressure (as indicated by the manometer) to 40 mm. (by partially closing the outflow stopcock).

In a similar manner, if one wants to awaken the patient more quickly, one should turn the indicator to zero so that all ether is excluded, and raise the pressure to 30 to 40 mm. of

mercury. For ordinary insufflation anæsthesia, the pressure should not be over 20 mm. In the course of an intrathoracic operation, the pressure of the air and ether mixture, given when the chest cavity is open, must depend upon the amount of distention of the lung that is desired, and can be controlled by instructions from the operator. Under ordinary circumstances, a pressure of 20 mm. will suffice to keep the lung moderately distended.

Up to the present time we have anæsthetized close on to 100 patients by means of intratracheal insufflation. Operations of the most varied kind were performed on different parts of the body. We have not seen a single untoward symptom during or after the anæsthesia. During the anæsthesia, the color of the patient remains pink, the breathing is slow and very superficial, the pulse is slightly accelerated. The rate of the pulse can often be controlled by the anæsthetizer, if the cardiac oscillations of the mercury column in the manometer are marked. In about half of the patients, it has been possible to cause apnoea by raising the pressure to 40 mm. For practical purposes this is, however, unnecessary.

We have had one patient in whom complete anæsthesia could not be obtained by the insufflation.

A young girl upon whom an interval appendicectomy was to be performed, was anæsthetized with ether in the ordinary way, and the intratracheal tube introduced. Insufflation was then begun. In spite of careful manipulations, it was found that it was impossible to cause sufficient relaxation of the abdominal muscles to permit of the necessary intra-abdominal manipulations. The intratracheal tube was then removed, and the attempt made to cause complete relaxation by ether given by inhalation. This also failed, and complete relaxation was only obtained when chloroform was given.

This patient was evidently refractory to ether, although it may have been that the intratracheal tube was too small, and therefore too much ether escaped by the side of the trachea. Careful experimental investigations will have to show whether chloroform can be safely given by intratracheal insufflation.

In a number of instances, operations which lasted two or more hours were performed under ether insufflation anaesthesia. We have gained the impression that the patients are less apt to show symptoms of shock than those anaesthetized for long operations by ether inhalation, but our experience is still too small to allow of any definite statement in this regard.¹

Vomiting is certainly rare after ether anaesthesia by intratracheal insufflation, and we have never seen any patient vomit during the course of the anaesthesia.

We have never seen any unpleasant after-effect from the anaesthesia. None of the patients were hoarse or complained of laryngeal symptoms after the anaesthesia, nor did we thus far observe any pulmonary symptoms in our patients. We have been surprised and gratified to find that the larynx and trachea are very tolerant of the intratracheal tube, and that, after the anaesthesia, the patients had no symptoms which could be referred to the presence, for a considerable period of time, of a tube in their larynx and trachea.

THE VALUE OF THE METHOD OF ANÆSTHESIA IN OTHER THAN THORACIC OPERATIONS.

As already mentioned, we shall report upon our experience with intratracheal insufflation in thoracic operations in the near future. We have, however, found that insufflation anaesthesia is valuable for many other operations.

The anaesthesia is very useful in operations upon the neck, such as thyroidectomy. In the first place, the anaesthetizer is away from the field of operation. More important, the operator can manipulate the trachea as much as necessary without causing disturbance in breathing or interference with the anaesthesia. Nor need he fear a sudden collapse of the trachea in the course of the removal of a large goitre; the presence of the tube in the trachea will guard against such complications.

¹Dr. C. H. Frazier suggested to me that this might be due to the retention of a small amount of CO₂ in the blood, and thus might be in accord with Yandell Henderson's theory of shock.

Insufflation anæsthesia should be very valuable in the operation of laryngectomy, but we have not yet had the occasion to perform a laryngectomy under insufflation anæsthesia.

The method of anæsthesia is of great value in operations upon the tongue and mouth and in operations upon the superior and inferior maxilla where the buccal cavity or pharynx has to be widely opened. There is no danger of aspiration of blood into the lungs, tamponade of the larynx is unnecessary. No blood can run down into the trachea. The current of air which is continually flowing upwards in the trachea by the side of the tube will blow out all of the blood which tends to run down into the larynx and trachea.

The anæsthesia should be useful in those operations in which the patient has to be placed flat on the abdomen. Thus it should be advantageous in those operations upon the brain and spinal cord, such as bilateral suboccipital craniotomy and laminectomy, in which the patient has to be in the prone position and in which the giving of the anæsthesia is ordinarily difficult.

LAMINECTOMY FOR INJURY AND TUMOR OF THE SPINAL CORD.*

WITH A REPORT OF SIX CASES.

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PROGRESS in the surgical treatment of injury and disease of the spinal cord seems to make haste slowly and to be the subject of considerable argument and disagreement among those whom we may consider as authorities. At one extreme is the opinion recently given by Estes:¹ "Early operation offers the only chance for life in a case of complete transverse lesion high up in the cord; it may not only preserve life, but also in a few cases restore some degree of usefulness to paralyzed parts when the lesion is from the middorsal region downwards." On the other hand Spiller and Allen believe that a study of spinal cords removed in cases of fracture will induce a very skeptical attitude and doubt as to whether operation is of much advantage and as to whether the chances would not be greater for the patient without it. They believe that the only effect secondary degenerations could possibly have, would be to *prevent* recovery. They do not believe that hemorrhages or œdema are imperative causes for operation. Starr, however, believes that, "if the cord is only partially injured, an operation may do good when it is evident that the symptoms are kept up by a permanent compression." But he believes that, in the majority of cases, it is necessary to refuse operation because without evidence of pressure an operation can have no result, as the nervous symptoms are due to actual permanent destruction of spinal cord tissues *incapable of repair*. Murphy also states that, "in fractures with

* Read before the Philadelphia Academy of Surgery, February 6, 1911.

¹ Amer. Jour. Surg., 1910, vol. xxiv, p. 341.

division of the true cord, operation with suture of the cord is absolutely worthless, as functional regeneration of the column of gray matter never takes place."

All theoretical reasoning, all experimental evidences, however, seem to be set at naught by the reported instances of recovery of more or less power after complete severance of the cord, in Harte and Stewart's celebrated case, in those of Fowler, Briggs, and Sherris, and in two others recently reported by Estes. Also in the cases of perforation by bullet reported by Pilcher, Pegram, and Haynes.

In the first case reported by Estes he made "a complete section of a disintegrated cord, at the first lumbar vertebra, removed about three-quarters of an inch of the cord, squared the ends, and brought them together with sutures. The man was considerably improved as regards trophic and sensory disturbances, but never regained the use of his lower limbs."

In the second case he resected more than half the thickness of the cord in the lower dorsal region at the level of the ninth and tenth dorsal, leaving the anterior column only intact, and drew the ends of the lateral and posterior columns together by suture. Sensory and trophic paralysis improved almost immediately. The patient finally recovered the use of the left lower extremity, the use of the flexors of the right extremity, and almost entirely the use of the sphincters. By the aid of a brace he can walk with comparative ease.

Such evidence is, of course, impossible to refute, but taking all the evidence bearing upon cord suture, it seems highly improbable that such a procedure can be of any value. Operations for conditions depending simply upon compression of the cord, however, seem to offer sufficient encouragement to warrant operative interference in practically all cases.

Another phase of spinal cord injury is equally as interesting, namely, concussion, a term accepted by some and rejected by others. Stacks of literature have been written about it, and many an expert witness has been paid a fee for testifying to its existence, but "to the impartial observer the conviction must be inevitable that the weight of evidence is against the

existence of the condition" (Bailey). Many of the statements in favor of the state of concussion have been derived from the finding by the surgeon at operation of an apparently normal cord, but we now know that tremendous damage may be done to the cord, the white and gray matter being shaken up together and indistinguishable, or one driven like a wedge into the other, and yet no visible external change is discernible. The comparison with a numbed and tingling nerve or with concussion of the brain is not a true one, as the surroundings of the cord are entirely different and the symptoms of its injury never transitory.

With this brief and fragmentary introduction I wish to report the following cases. I will greatly abridge the histories:

CASE I.—A man, aged twenty-five, was hit by a locomotive engine on July 4, 1910. He was picked up unconscious, and was sent to the Chester County Hospital. In a few hours he regained consciousness, and it was noted that there was complete sensory and motor paralysis below the tenth dorsal segment. The sphincters were paralyzed, but priapism was absent. As no improvement was noted in 48 hours, the attending surgeon, Dr. Woodward, asked me to assist in the performance of laminectomy. I found the conditions as described and a depression in the back over the tenth dorsal vertebra. We were afraid to attempt to elicit crepitus. There were no tests for heat and cold sensation made. The reflexes were absent.

Laminectomy was performed on July 6, 1910, under ether anæsthesia. I found the posterior spinous process of the tenth dorsal vertebra fractured at its base, and the laminæ of the same vertebra also fractured and the fragments driven in to the neural canal. They were removed and some hemorrhage encountered external to the dura, which membrane seemed cedematous and thickened.

The posterior portion of the ninth vertebra was next removed and the dura opened. The spinal fluid was under tension, and the cord appeared congested at the site of injury, but no other abnormality was noted. There was no hemorrhachis. The dura was sutured with fine chromic catgut, the muscles and

fascia with chromic catgut, and the skin with silk. A small cigarette drain was placed between the muscles and removed in 48 hours. Two days after the operation sensation began to improve and four days after operation motion began to appear. On the fifth day control of the bladder was regained. A bed-sore developed at the end of the first week and gave considerable trouble owing to the fear of infecting the wound. He was sent to the County House at Embryville in the fall and I saw him on December 7, 1910. He had perfect restoration of sensation as far as I could determine, could walk with ease although a little stiffly, could rise from a chair without using the hands, and had perfect sphincteric control. His back was strong, and he would not wear the brace we had procured.

CASE II.—A man, aged thirty, was injured in December, 1909, by a large rock falling on his back. He experienced loss of motion and sensation in the lower limbs and loss of sphincteric control. He remained in a hospital three weeks and at his home seven months without improvement. He was admitted to Dr. Frazier's service in the University Hospital, August 6, 1910.

On August 10, 1910, the patient was examined by Dr. McConnell, who reported as follows: "The patient shows a complete paralysis of both lower extremities, no movement being made by either the thigh or leg muscles. There is very marked toe-drop, with contracture of the flexor tendon and tendo achillis. The palsy of the thigh muscles is flaccid with contraction of the extensors. All reflex in the lower extremities is lost. There is very marked atrophy, relatively more in the thighs than in the legs. He has complete loss of sensation for touch and pain in both legs up to the head of the tibia on the inner side of the leg and in the thighs corresponding very closely to a line drawn from the great trochanter to the inner side of the knee and from here to the pubic spine. This leaves an irregular triangular area in which sensation to touch and pain is preserved. The posterior surface of the thigh between these two lines shows analgesia and anæsthesia, which extend over both buttocks as high as a line drawn from one great trochanter to the other. This area of analgesia and anæsthesia involves the scrotum and the perineum, also the penis. The cremasteric reflex is present on both sides."

Laminectomy, August 15, 1910, under gas-ether anæsthesia.

A longitudinal incision was made over the last thoracic and the first three lumbar vertebræ. The first lumbar vertebra was distorted and evidently the seat of an old fracture. It projected into the neural canal. The posterior portions of the first and second lumbar vertebræ were removed, the dura was opened, and a cystic condition found about the cord extending about one and one-half inches in length and immediately under the first vertebra. The dura was adherent to the vertebra and the cord adherent to the dura. After loosening the intraneural adhesions, the spinal fluid began to flow freely from the upper portion of the canal. The cord seemed to be intact, but was grayish in color, rather hard at its lowest portion, and the roots of the cauda equina were adherent. Several of the roots were freed from adhesions to each (combed out) but this was not extensively undertaken, as it was feared that they might be torn in the process. The dura was then sutured with a continuous catgut suture and the muscle closed with chromic catgut. A small rubber tube was inserted between the edges of the closed muscles and brought out on the back through a separate stab wound. The skin was closed with silk.

Forty-eight hours later the drainage was removed, and at the end of a week the stitches were taken out of the skin; the wound had healed by first intention. Seven days after the operation the patient's condition seemed improved, there was no return of motor power, but the area of sensation had widened. At the end of the second week the patient claimed that sensation had returned in a very slight degree over most of the foot and leg. He was discharged from the hospital two weeks later in the same condition.

If there is such a thing as concussion of the cord, then my first case represents such a condition, and perhaps the man would have recovered just as well without the operation. If such does not exist, a simple contusion or the results of œdema were responsible for the paraplegia, and the removal of the compressing bone must have helped in the recovery. In the second case, immediate operation was not performed, the arch of the vertebra continued to press on the cord, and who knows but what the hopeless result was caused or exaggerated

by the organization of a cellular infiltrate caused by the compressing bone? The neurologists who refer to the injury to the cord as having been done in the twinkling of an eye, and as beyond regeneration or help from the surgeon, speak from the experience of the fatal cases. The literature contains many instances of more or less complete recovery after operation, especially those cases in which the compression is caused by fragments which have been driven forward into the neural canal.

A few years ago C. E. Black reported a collection of 552 cases taken from the literature. Of the cases operated on, 49.2 per cent. recovered and 40 per cent. died; of those not operated on, 25 per cent. recovered and 65 per cent. died. The fracture cases gave the following figures: the mortality of operation in the cervical region was 71 per cent., without operation, 85 per cent.; in the dorsal region 48 per cent., without operation, 64 per cent.; in the lumbar region, 26 per cent., without, 50 per cent. Many of these cases are old and before the technic of aseptic surgery reached its present perfection.

Even as long ago as 1898 Prewit tabulated 49 cases of gunshot wounds of the spine treated since the aseptic era. Of this number 24 were operated on with 13 deaths, and 25 were not operated on with 17 deaths. Haynes collected the cases of gunshot injury from the date of Prewit's paper up to 1906 and found a mortality of 42.5 per cent. in the operated cases and 69.25 per cent. in those not operated on.

I believe that Bailey finds the true solution when he states that "somewhere between the two extreme positions the wisest course lies." In fractures and dislocations of the cervical and high dorsal regions operation should rarely be undertaken, unless there is evidence to show that comminution of the bones has occurred. The X-ray should be employed, as palpation for crepitus is too dangerous. In the lower dorsal, and especially in the dorsolumbar region, early operation offers a better chance for the restoration of function than the expectant plan. The mortality of laminectomy at the

present time should be less than 10 per cent. in fractures below the middorsal region.

It may be of interest to recall that Steinmann has recently collected 20 cases of forcible reduction of cervical dislocations without laminectomy, with 12 recoveries.

Tumors of the Cord.—Some 20 years ago the first successful extirpation of a spinal cord tumor was performed by Horsley.

In 1895 Starr analyzed 123 cases of spinal cord tumor, in 22 of which laminectomy was performed, with 50 per cent. mortality and 6 recoveries. In 1902 Collins collected 70 cases recorded since Starr's paper, with 30 operations and 12 successful results. In 1907 Oppenheim states that recovery takes place in about 50 per cent. of the cases presenting a typical clinical picture of extramedullary growth. Last year Bailey reported 6 cases in which extirpation was attempted, with 3 recoveries, 1 doubtful case and 1 death; Hunt and Woolsey record 11 laminectomies with 1 operative death and 4 successful cases out of 6 where the growth was extramedullary. In 1909 Oppenheim reported that he had obtained cures in 13 out of 25 patients with tumors in the spinal canal.

As soon as the diagnosis of tumor can be made with reasonable certainty an operation is indicated. I am not sure but that if I had symptoms even *suggestive* of spinal cord tumor I would have an exploratory laminectomy performed. In a case reported recently by Inglis, Klingman, and Ballin, an extramedullary glioma was removed quite early from a patient whose only symptom was sharp, circumscribed pain in the area supplied by the seventh thoracic nerve. A complete recovery resulted. Another interesting case with a fine result is reported by Moffitt and Sherman. It is generally impossible to differentiate positively between the intramedullary and extramedullary growths clinically, as pain may be absent and dissociated anæsthesia present in extramedullary growths; the patient should be given the benefit of the doubt. Bailey believes that the absence of anæsthesia contraindicates operation. The operation is supposed to be hazardous, and

the statistics of Krause are now being quoted in support of this statement. He operated on 26 patients with 8 deaths. But if we compare Hunt and Woolsey's cases with only 10 per cent. mortality, the results seem better. Elsberg believes that operations for tumors of the spinal cord in the cervical region should be done in two stages, a small incision being made in the dura at the first operation through which the growth will extrude, thereby making it more easy of removal at a second operation.

CASE III.—A woman, aged fifty-six, was admitted to the University Hospital August 18, 1910, complaining of weakness in the right hand and right leg. She was referred to me by Dr. D. J. McCarthy, and a more detailed report of the case will be made later.

More than two years ago the patient began to drag the lower limb, and shortly afterwards to weaken in the right upper limb. After a period of rest and treatment, the weakness of the right upper and lower limbs seemed to entirely disappear. In August, 1909, the condition returned and had been gradually increasing until the present time. In January, 1910, severe shooting pain was experienced, shooting from the right shoulder into the finger, which would feel as if drawn at times and the hand was numb. The right hand and arm were slightly swollen and cyanotic and extremely weak.

All of the movements of the right arm were weak and the shoulder motion much impaired. Passive motion was painful. The right lower limb was also weak, especially of the ankle and toes, where the power was slight. Patella reflex was prompt and exaggerated on the right side, but absent on the left. Clonus absent, Babinski typical on the right and uncertain on the left. The patient recognized the movements of the toes upwards and downwards on either side but made mistakes in locating the toe on either the right or left foot.

The sensation of heat and cold was normal in the right lower limb, in the right upper limb, and also in the left upper limb, with the exception that heat and cold were perceived more distinctly in the right hand. Ice water was felt as warmth in the entire left lower limb and left side of trunk, back and front,

as far as about the third interspace. Pin prick was normal in the right upper and lower limbs, was greatly impaired in left side of trunk, back and front, as high as the third interspace. Pin prick was not so acute in left hand as in the right. Tactile sensation was about normal everywhere.

Laminectomy, August 22, 1910, under gas-ether anæsthesia. The incision was made over the fourth, fifth, and sixth cervical vertebrae to the bony surfaces of the posterior spines. After cleaning off the muscles the laminae of the fifth vertebra were removed and the dura exposed. The bones were extremely thin. The dura appeared normal, but pulsation was extremely faint. It was opened and the cord found normal in appearance and free from adhesions. Upon insinuating the Horsley separator upwards, a mass was felt just above the opening. Accordingly, the fourth and fifth spines were removed and the laminae of the fourth vertebra rongeured away. After opening the dura still further, a tumor was found on the anterolateral aspect of the cord, oval in shape, and about 1.5 cm. in diameter. The anterior and posterior roots of the fourth segment were tightly stretched over the tumor, and the roots of the fifth were pushed upon. The cord itself was compressed and deviated to the left. The tumor seemed to grow from the pia arachnoid and not from the dura. The fourth root was gently pulled upwards on a blunt hook, and a slight incision made at the junction of the tumor with the cord, and the growth easily shelled out with the handle of a teaspoon. Comparatively little bleeding was encountered and it was soon checked. The dura, muscles, and skin were closed in the usual manner. Microscopic examination of the tumor revealed the appearance typical of endothelioma. The patient made a good operative recovery, and at the present time, six months' after the operation, is alive and well and rapidly improving as regards function.

The following two cases are reported to complete the series:

CASE IV.—A Chinaman, aged forty, was referred by Dr. McCarthy from his ward in the Philadelphia Hospital to Dr. Frazier's service, with symptoms of compression of the cord referable to the twelfth dorsal and first lumbar regions. August 14, 1908, I performed a laminectomy of the first, second, and

third lumbar vertebræ and found no tumor. September 4, 1908, I again operated and removed the eleventh and twelfth dorsal laminae, and between these there was considerable connective tissue, dense in consistency, and seeming to press upon or constrict the cord. It seemed to take origin from the intervertebral disc but was not cartilaginous. It was cut away with scissors and the wound closed. The patient recovered control of the bladder, and somewhat of sensation after operation, but never recovered the power to move the legs. He died in the Philadelphia Hospital one year later. Microscopic examination of the tissue removed showed no evidence of neoplasms, tuberculosis, nor syphilis.

CASE V.—A colored man, aged forty-five, also referred from Dr. McCarthy's ward in the Philadelphia Hospital to Dr. Frazier's service, had been operated upon previously in another hospital and his prostate removed. It was said to have been carcinomatous. He was suffering from a paraplegia and intense pain due to compression of the lower portion of the cord and roots. I performed laminectomy, September, 1908, at the Philadelphia Hospital, and found much softening and disease of the third and fourth lumbar vertebræ, but was not able exactly to ascertain whether there was pressure on the cord or not. The muscles and the bones bled considerably during the operation, and twenty-four hours later the patient died from shock.

Cysts.—Circumscribed spinal serous meningitis as a distinct disease has been recognized since 1903, and a number of cases have been reported since then. Last November, in association with Dr. T. H. Weisenberg, I reported² a case successfully operated on and discussed the condition. This patient (Case VI) had the laminectomy performed on March 16, 1910, at which time a cyst was found at the level of the tenth dorsal vertebra. At the present time the patient has entirely recovered from the symptoms of compression, is able to work as a stenographer, and to attend dances. At the end of the day her back often feels tired and often aches, but relief is afforded by adhesive plaster stripping.

² Amer. Jour. Med. Sciences, November, 1910.

ORGANOSCOPY.

CYSTOSCOPY OF THE ABDOMINAL CAVITY.

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IN October, 1910, Jacobaeus, of Stockholm, published a brief note in the *Münchener medizinische Wochenschrift* concerning the possibility of cystoscopic investigation of the serous cavities.¹ According to his plan the abdominal cavity is punctured with a trocar, corresponding in size to a No. 17 Charriere catheter. Through this tube, which has a trap-door, filtered air is first pumped into the peritoneal cavity and then a Nitze cystoscope, corresponding in size to a No. 14 Charriere, is inserted. The cystoscope, too, has a trap-door to keep the air pumped into the peritoneal cavity from escaping.

By this method it was possible to subject to visual examination the abdominal viscera in certain obscure conditions, in which a large incision or one of sufficient size to permit the introduction of the hand was objected to by the patient and not considered desirable by the physician. In other words, Jacobaeus hoped to do for the general abdominal cavity what is now an every-day occurrence as regards the bladder—to diagnose conditions by means of the cystoscope.

After some practice on the cadaver, Jacobaeus made clinical use of this instrument in 17 cases of ascites, the method of procedure having been, first, to draw off the fluid through the trocar and then pump air in before inserting the cystoscope. In one case he diagnosed a metastatic nodule in the

¹H. C. JACOBÆUS: Ueber die Möglichkeit die Zystoskopie bei Untersuchung seröser Höhlungen anzuwenden, Münch. med. Woch., No. 40, 1910.

liver; in another carcinoma of the stomach; and in still another a general carcinosis of the intestines. He also used the method twice in the pleural cavity, but could make out nothing definite.

Early in 1910 a similar idea had occurred to us, and in April of the same year, we started some experimental work in the Hunterian laboratory to decide as to the feasibility of the idea. Its possible worth soon became apparent, and we have now evolved the following method of procedure:

An ordinary proctoscope of one-half inch bore, the distal end of which is blunted by means of a metal collar, serves as the cystoscope. An electric headlight furnishes illumination. Through an incision made in the epigastrium of sufficient size to accommodate the instrument, the tube is inserted (without obturator) until its blunted end comes down on the anterior wall of the stomach. The normal peritonitic fluid will allow the tube to gently glide from place to place, and first the lesser, then the greater, curvature can be thoroughly inspected. Following this, the gall-bladder can be easily located and viewed, together with the underlying surface of the liver. On withdrawing the tube a little until the distal end is again just over the stomach, its outer end is tilted almost flat on the outer abdominal wall until the parietal peritoneum comes into view. By inserting the tube further in then and sweeping it around, always keeping the parietal peritoneum in view, the abdominal cavity can be inspected with surprising freedom. The omentum naturally precludes a good view of the intestines, unless, as is sometimes possible, one can shove it aside or get under it, but the tube can without difficulty be swept over the whole upper surface of the liver, so that this and the overlying diaphragm can be brought into view. There is always the possibility of encountering adhesions, and it is on this account that the obturator is dispensed with, because when seen they are easily avoided, the involved area being inspected on all sides.

In addition to this, acting on the theory that nothing definite has been found in a given case, we have drawn a part of

the stomach out through the wound, made an incision in its anterior wall, and inserted the cystoscope directly into its cavity. A stomach tube passed in through the mouth acts as a guide in this procedure and aids in a careful inspection of the whole gastric mucosa. On withdrawing the cystoscope, the wound in the stomach is closed in the usual way.

In certain cases of early carcinoma of the stomach, this method of examination may prove of some value. Likewise, the presence of an obscure ulcer may be thus disclosed and submitted to the proper treatment. In cases of ordinary exploratory operation for carcinoma, before having recourse to the usual large incision, the cystoscope introduced through a very small and relatively unimportant incision, possibly made with cocaine, may reveal general metastases or a secondary nodule in the liver, thus rendering further procedures unnecessary and saving the patient a rather prolonged convalescence. In other obscure conditions of the upper abdomen,—possibly the abdomen in general,—the diagnosis might be cleared up by this simple method. Its field of usefulness also might in the future be extended to the thorax, though this is a development which we ourselves have only in mind.

Through the courtesy of Dr. W. S. Halsted, we were first enabled to try our method clinically. The patient was a man who had been deeply jaundiced for some time, and in whose abdomen a markedly distended gall-bladder could be palpated. In the upper right epigastrium the tube was inserted, coming down first upon the omentum. This was shoved aside and by dipping the outer end of the cystoscope on the abdominal wall, the distal end was easily manipulated until it came up against the distended gall-bladder. This was inspected carefully on all sides and down to its neck. There were no adhesions and no abnormalities. Following this, in the manner described above, the parietal peritoneum was brought into view, and then the whole surface of the liver was inspected. No nodules were discovered. The tube was then withdrawn and the incision enlarged for the usual exploratory laparotomy, whereupon a carcinoma of the head of the pancreas was found. The

cystoscope findings as regards the gall-bladder and liver were corroborated; in other words there were no metastases. Obviously, a structure lying as deeply as the pancreas could not be inspected.

In a second case, that of Dr. William A. Fisher, Jr., the cystoscope was brought into use in order to rule out, if possible, the presence of a gastric ulcer. This we succeeded in doing, the case proving to be one of chronic appendicitis.

Though it is hardly possible to decide as to the merits of any procedure by two clinical cases, we feel that the results obtained in these cases were sufficiently encouraging to warrant a further trial.

THE TREATMENT OF CHRONIC PANCREATITIS BY PANCREATOSTOMY.

A NEW OPERATION.

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THOUGH chronic pancreatitis was recognized post mortem many years ago, it was not found in the living until 1891, when Robson¹ observed the enlarged pancreas while doing a cholecystotomy. His first cases were mistaken for malignancy, but recovery showed the condition in its true light. In 1892 he was able to demonstrate the nature of the enlargement by microscopic examination. The development of surgery of the bile passages has led to much of our present knowledge about pancreatitis, as it is found frequently at operations for gall-stones.

The importance of chronic inflammation of the pancreas as a complication of gall-stone disease has been emphasized by a number of investigators. W. J. Mayo,² in calling attention to pancreatitis resulting from gall-stone disease, reported that he had found the pancreas involved 141 times in 2200 operations on the gall-bladder and biliary passages. Of all pancreatic diseases operated by Mayo, 81 per cent. were "due to or accompanied by gall-stones." Most observations regarding chronic disease of the pancreas have been made by operators interested in liver surgery, and operations have usually not been undertaken until biliary disease, if it were not the cause of the pancreatitis, had become a complication of it. Though it is a well-established fact that disease of the bile passages is the most common cause of pancreatitis, it is also true that the pancreas is sometimes the point of origin of disease, and through its anatomic relation with the common duct produces jaundice and other biliary disorders. It is significant that in Robson's first cases of chronic pancreatitis, jaundice

was present and the operations were made upon a diagnosis of stones in the common duct, but no stones were found. An investigation of a considerable number of cases of chronic pancreatitis, both with and without pancreatic calculi, resulting in death and followed by autopsy, shows that 50 per cent. had never been jaundiced; and in only 15 per cent. was the presence of gall-stones noted. Thus it is seen that while cholecystitis with gall-stones frequently causes chronic pancreatitis, it often arises from causes independent of the biliary system.

At present the treatment of chronic pancreatitis consists in drainage of the gall-bladder, either by cholecystostomy or by cholecystenterostomy. This, no doubt, cures the majority of cases brought to the operating table, as most of them come to operation for gall-bladder disease, the relief of which either removes the cause of the pancreatitis or by some effect on the hepatogastropancreatic system aids a restitution to normal. The mere subverting of the bile stream will sometimes fail to cure a pancreatitis, especially one which has arisen from some cause within the pancreas, and in which jaundice, if present, has been produced late in the progress of the pancreatitis by pressure of the swollen gland upon the common duct. In pancreatitis due to the presence of calculi in the duct of the gland or in its parenchyma, the inadequacy of gall-bladder drainage is evident.

Our knowledge regarding chronic pancreatitis, aside from those cases associated with biliary disturbance, is very meagre. This is due to the fact that the pancreas probably produces fewer and milder symptoms for the same degree of disease than does any other organ in the body. In 1882 Pepper³ wrote: "It is unfortunate to have much to say, and yet to have no intelligible language in which to express it. This is somewhat the lot of the pancreas."

Not until operators come to consider the pancreas a field for successful work, will the confusion that now exists regarding its diseases be dispelled. We must operate just as freely for obscure disease in the upper abdomen probably involving the pancreas as we operated a few years ago for disease prob-

ably involving the gall-bladder or probably involving the appendix. Almost every operation upon the pancreas now recorded was done as a result of undertaking an operation upon some other organ through a mistaken diagnosis. Excepting the drainage of cysts, surgical manipulation of the pancreas is very unusual.

The thorough and convincing experiments of Senn⁴ made in 1886 seem to be forgotten by surgeons of to-day. His experiments were performed on healthy dogs and cats, and the observations he made hold good in the human subject. We have confused the baneful action of pancreatic secretion in acute hemorrhagic pancreatitis accompanied by fat necrosis, with its action at other times. Senn showed that subcutaneous crushing or comminution of the pancreas, followed by an escape of its secretion, is not a fatal or even a dangerous accident, when the gland is otherwise normal.

In a great measure our timidity in dealing with the pancreas is due to erroneous deductions. In 1903 Von Mikulicz-Radecki,⁵ in an article which was generally accepted as the last word in surgery of the pancreas, said: "When we seek the cause of the tardy development of the surgery of the pancreas, we find we can ascribe it principally to three general reasons, which we must consider carefully, as they show us that which we may expect from this branch of surgery in the future." The reasons given by him are as follows: (1) The topographical relations of the organ. (2) The difficulty in diagnosis. (3) The operation, so far as it includes the organ itself, is much more dangerous than an operation upon any other abdominal organ. Hemorrhage is difficult to control. Necrosis is caused by deep sutures. In spite of deep and heavy ligatures *en masse*, blood and pancreatic secretions ooze into the peritoneal cavity, preventing the formation of peritoneal adhesions. Secondary hemorrhage is apt to occur. There is great danger of fat necrosis, due to the special secretion of the gland leaking from the injured parenchyma.

In our own case which we shall shortly report, we undertook the operation in a spirit of desperation, and then quietly

awaited the patient's certain death afterward from some of the causes just given. This probably represents the state of mind in which most surgeons would be found should it suddenly become necessary that an extensive operation be made upon the pancreas.

Though the observations of Von Mikulicz-Radecki were based upon a large number of cases, 60 in all, 30 of them were gastrectomies for cancer, and as the pancreas was involved in the cancerous process, they were counted as cases of pancreatic surgery. It was taken for granted that an increased death-rate after gastrectomy with injury of the pancreas from freeing adhesions was due to the pancreatic involvement. The remaining 30 cases of Von Mikulicz-Radecki included 10 pancreatic cysts, 15 malignant growths, 1 contusion with hæmatoma, 3 cases of pancreatic tumor, and 1 case of chronic pancreatitis. It is possible that observations based upon such cases as are reported by Von Mikulicz-Radecki may not be applicable to chronic pancreatitis. Undoubtedly, certain conditions such as fat necrosis and uncontrollable hemorrhage, present in one pancreatic disease, are not to be found in all pancreatic affections; and while we may have to meet these difficulties, we may learn when to expect them and how to avoid them. Let us hope that in chronic pancreatitis we may prove to have exemption from all the dire results that are said to accompany surgical interference in other pancreatic disorders.

In our limited experience, the chronically inflamed pancreas can be cut, sewed, and worked upon as safely as can any other organ of the body as regards the organ itself. It is true that the topographic relations of the pancreas make it difficult to reach, and that a diagnosis is not easy. In chronic pancreatitis we have not found hemorrhage difficult to control. We have not found necrosis caused by sutures properly placed. We have not been troubled with oozing secretions preventing peritoneal adhesions. We have seen no secondary hemorrhage, no fat necrosis. It may be urged that some change due to the diseased condition has protected our patient from these

operative accidents; this we think true to the extent that in chronic pancreatitis there is a great production of connective tissue. However, as a microscopic examination of the portion of pancreas removed in this case shows the presence of much normal gland structure, we may consider this case open to the accidents peculiar to pancreatic tissue. The presence of connective tissue found in chronic pancreatitis makes the gland much easier to handle than it is in other conditions; it is not so readily torn, stitches hold better. We might expect bleeding after incision to be worse, as it is in other sclerotic organs, the tonsils for example.

I desire to report the following case. It is the first case on record in which pancreatostomy has been performed for chronic pancreatitis and is the seventh case operated for pancreatic stone.

February 14, 1910, I was asked by Dr. W. F. Holman of Clarks Hill, Indiana, to examine a lady, supposed to be suffering from some disease of the stomach, probably malignant. She had been under his care for two months. The patient was twenty-two years old, five feet six inches tall, and weighed 118 pounds. She was emaciated and very anæmic. There was no jaundice, the sclera were clear. Her face was peculiarly marked with curved lines, the concavity of which was opposite the oral cleft on each side—such lines as the older clinicians considered indicative of chronic gastro-intestinal disease.

Family History.—Father living. Mother died of tuberculosis of the bowels at forty-four. Two brothers living, two brothers and two sisters died in infancy, one brother died at twenty-three from obstruction of the bowels.

Past History.—She has had no serious illness, such as typhoid or malaria, never had mumps. As far back as she can remember, from the time she was a little girl at school, she had been frail and has had occasional vomiting spells. She would be free from these attacks for six months or longer, when they would return for a short while. In September, 1909, she had a severe attack, vomiting every few days, losing much weight, and becoming very pale. At that time she was treated by a physician for "stomach trouble." She had attacks of pain

centring on the left side just under the ribs, and was tender there constantly. From September, 1909, until I saw her in February, 1910, she suffered continually. She never had diarrhoea. Her stools had never attracted attention from any peculiarity such as free fat. Any slight exertion, such as sweeping or lifting, would bring on a paroxysm of pain. Pain always started in the left side on a level with the left kidney and slightly toward the median line, then passed around her waist, "making a circle around her," and down the left ureter. A drink of water excited this pain as quickly as the water reached the stomach. She obtained relief best by lying on her back or on the left side. Her favorite position was obtained by placing several chairs together so that she could lie on her back with her feet resting on the top of one of the chairs. Her menstrual function was established at thirteen, and had always been normal except for short periods of amenorrhoea when she was anæmic from her chronic affection.

Examination.—The thoracic organs were found to be normal. The abdomen was symmetrical, and there was no evidence of any muscular restriction on respiration. The lumbar regions were symmetrical. Light palpation elicited no rigidity or heightened cutaneous reflex over any part of the abdomen. Heavy palpation revealed a very tender point accurately defined just under the junction of the left midclavicular line and the confluent costal cartilages. The tenderness subsided as the pylorus was approached; and the liver and gall-bladder were not tender in the least. There was marked tenderness along the course of the left ureter. The appendix was not tender. There was a tender spot to the left of the tenth and eleventh dorsal spines. Bimanual palpation below the left kidney revealed tenderness but no ptosis.

The patient's urine was examined and proved to be free from sugar and albumin, but filled with cells of different kinds, including pus. As she complained of bladder symptoms, I went to her home and catheterized her ureters. In the specimens obtained direct from the kidneys nothing of note was found except red blood-cells, which were attributable to the trauma of passing the ureteral catheters. The Cammidge test was not made.

March 14, 1910, she was brought to the Methodist Hospital

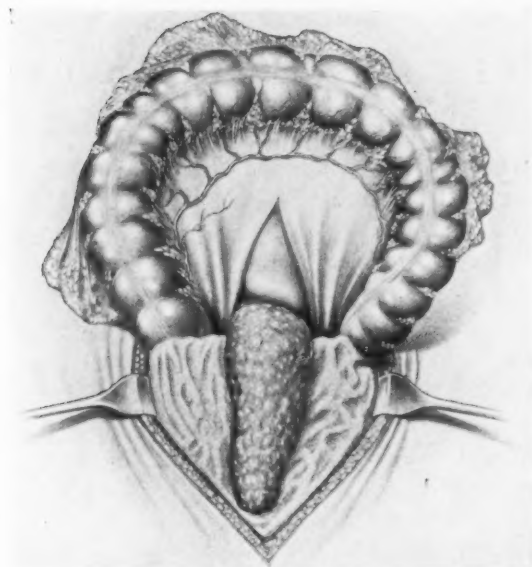
for closer observation. Taking advantage of an attack of her pain, I again catheterized her ureters, but over a period of one-half hour obtained no urine from the left ureter. That led me to suspect an intermittent hydronephrosis. I then passed leaded bougies into the ureters and had radiograms made of both kidneys. The radiograms were poorly made, and it was necessary to repeat the experiment. The second plates were poor also, but seemed to show a variation in the pelvis of the left kidney as indicated by the direction of the shadow cast by the upper portion of the bougie. I measured the capacity of the pelves by injecting them, but found them equal and normal. It was decided to make an exploratory operation, first exposing the left kidney.

Operation.—Drs. Holman and Strickland assisted in the operation. Having catheterized the left ureter that I might know whether or not it was patent throughout by finding the catheter in the pelvis of the kidney, I made a lumbar incision and exposed the left kidney. The ureteral catheter had reached the highest point of the kidney pelvis. The pelvis was normal. The kidney had the appearance of being involved in a surrounding inflammatory process. It was decided that the kidney could not be the cause of the patient's condition, and further exploration through the lumbar incision was begun. Directly in relation with the kidney was a peculiar, pointed object, which felt like a bag of fine sand. It was about the size and shape of a moderately distended gall-bladder. It occupied the anatomic position of the tail of the pancreas, and was recognized as such. The kidney was replaced and the wound closed, a drainage tube being placed as usual after disturbing the kidney.

The patient was turned on her back, and remained on the elevating sand pillow used for exposing the kidney. A vertical incision four inches long was then made above the umbilicus slightly to the left of the median line. The gall-bladder and bile ducts were carefully examined and found to be normal. The stomach was normal. There were no adhesions.

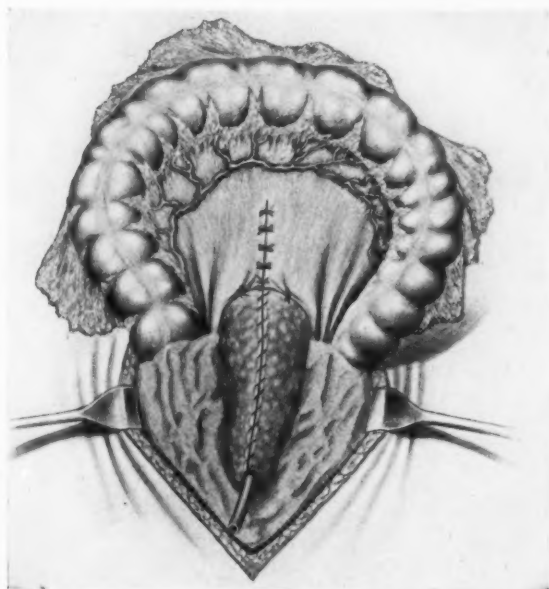
The colon was lifted, and a suitable place being chosen, a rent was made in the mesocolon, which, except for being larger, was like the opening for a gastro-enterostomy. The pancreas was enlarged symmetrically. The head was as large as a man's clenched fist, and the body was the size and shape of a

FIG. 1.



Showing the pancreas brought through the opening in the mesocolon. The stomach is seen just above the pancreas.

FIG. 2.



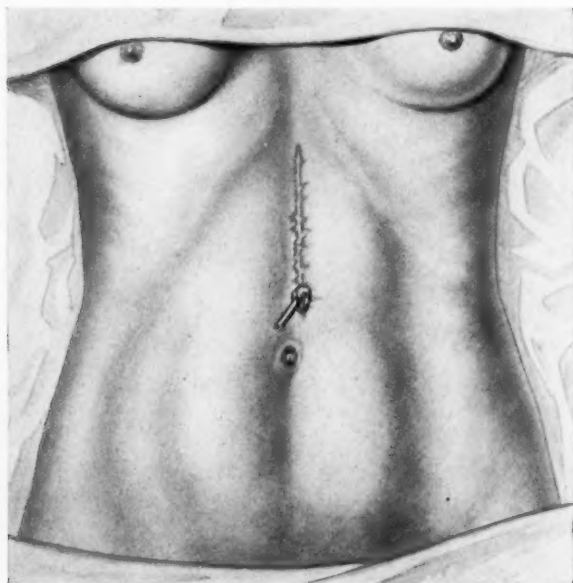
The pancreas is shown with the drainage tube inserted, and the incisions in the pancreas and mesocolon have been closed.

FIG. 3.



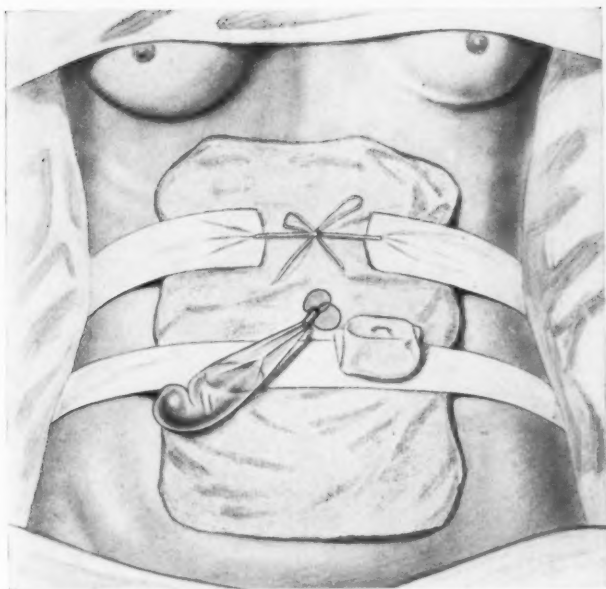
The method of placing the omentum so as to cover the suture line in the pancreas is here shown.

FIG. 4.



The tail of the pancreas with the drainage tube projecting is seen at the lower angle of the healed wound. (Drawn from life.)

FIG. 5.



The method of dressing and collecting the drainage is shown. The drainage sac is carried in the pouch when the patient is standing.

FIG. 6.



Illustrates the pancreas brought through between the colon and stomach instead of through the mesocolon.

FIG. 7.



Microphotograph showing the extreme degree of fibrosis of the pancreas; the disappearance of normal parenchyma, and the relative immunity of the glands of Langerhans from the fibrotic invasion.

man's wrist. It gave the same sensation to the touch over its entire extent as of a bag filled with sand. I decided to explore the main pancreatic duct, and since it was apparent that the stony deposits in the parenchyma could not be removed, to attempt direct drainage. In order to accomplish this successfully, it seemed necessary to have a channel of pancreatic tissue leading out of the abdomen for carrying the gland secretion. Tearing through the posterior wall of the lesser cavity, I seized the tail of the pancreas, and making gentle traction, began to enucleate it just as if it were a pyosalpinx covered with adhesions. It was a comparatively easy task to free the pancreas until the superior mesenteric artery was reached. As this enabled me to bring the tail out of the abdominal cavity easily (Fig. 1), I did not attempt to disturb it further. Sponges were placed in its bed to arrest hemorrhage, which was not at all alarming; the pancreatic branches of the splenic artery were not ligatured. I then split the pancreas in the middle line along about two-thirds of its length, after having protected the operative field with sponges. This opened the dilated duct of Wirsung, which was found to be filled with small faceted stones along its entire length. The stones, excepting those in the head of the gland, were removed. A small portion was excised from the middle of the gland for microscopic study.

A drainage tube made from a portion of a 16 F. red, soft rubber catheter was laid in the duct of Wirsung and allowed to extend beyond the tail of the pancreas for several inches. The gland was then closed around it carefully with a continuous suture of No. 1 chromic catgut (Fig. 2). Each suture included a fair amount of gland tissue. No effort was made to close the edges of the duct separately. No deep buried stitches were placed in the pancreas. In sewing the gland, care was exercised to have the continuity of the outer surface accurate; points of imperfect coaptation were reinforced by single stitches. In places where the duct was not large enough to include the drainage tube, the gland substance was united over the tube.

The opening in the mesocolon was carefully closed and stitched to the pancreas to prevent hernia into the lesser peritoneal cavity. The great omentum was used to cover the suture line in the pancreas above, being folded under the colon parallel with the mesocolon (Fig. 3). A gauze drain was placed below

the pancreas to separate it from the small intestines; this drain was brought out of the wound. The abdominal wound was then closed. The pancreas was brought out of the lower angle of the incision and was stitched to the deep muscular aponeurosis to keep it from withdrawing into the abdomen before becoming adherent. There projected at least one-half inch of pancreas beyond the skin, and out of the summit of the pancreatic tissue the drainage tube extended (Fig. 4). An ordinary rubber condom was tied over the end of the drainage tube.

Before the operation the patient's pulse ranged from 54 to 80; usually it was below 60, seemingly as a result of her disease. Her temperature was never above 99° . Immediately after the operation, the patient's pulse was 120. Within 48 hours it had gradually dropped to 76. The highest post-operative temperature was 100° . The temperature reached normal at the end of three days.

Pancreatic fluid began to flow from the drainage tube at once. This was collected and measured. The largest amount passed in 24 hours was 25 ounces and 6 drachms. The usual amount for the first two weeks was 24 ounces in 24 hours. After two weeks, this amount had become reduced to 18 ounces. At the end of the third week it was 6 ounces in 24 hours. This decrease was not due to a decrease in the secretion, but to the fact that as the pancreatitis subsided and the swelling of the gland became reduced, a greater portion was allowed to escape by the normal way. At the present time, drainage is from 2 to 8 ounces in 24 hours, according to circumstances. The tube was protruded through a cotton-filled pad, and no fluid reached the skin; except once or twice when a poorly tied tape allowed escape of fluid from the container, the skin has not been excoriated. This method of collecting the fluid in a condom (Fig. 5) is excellent to prevent soiling the skin. It was originated by Dr. G. J. Cook of Indianapolis for collecting bile after cholecystostomy. The patient, who is a very intelligent lady, lives 200 miles away in a neighboring State, and cares for the drainage herself.

Within three months after the operation she had gained 20 pounds; at the present time she weighs 148 pounds. Her old attacks have never recurred. She is able to ride horseback and to enjoy all the pleasures of life. She states that her

health is better than at any time for several years. By an artful arrangement of her clothing, and by having the drainage tube very short, she dresses and mingles socially among those who know nothing of her affection.

Pathological report by Dr. Jewett V. Reed:

Examination of Gross Specimen.—This consisted of a small wedge of pancreatic tissue, somewhat firmer in consistency than normal, and showing beneath the capsule of the gland numerous, fine, hard, white bodies about .5 mm. in diameter. Upon cutting the membrane over these bodies, they were easily removed and were found to be calcareous deposits. Over the cut surface of the specimen the finer ducts of the gland were considerably dilated, and contained numerous fine calculi which could be easily removed with a needle. The specimen was hardened in formaldehyde and divided into two portions, one of these was put through a process of decalcification in order to remove the calculi, the other was simply imbedded after hardening. Both of these were sectioned and stained with hæmatoxylin and eosin. Sections from the decalcified section showed practically the same changes as in the one untreated by this process but less distinct on account of the action of the acid.

The following microscopic report was taken from the specimen which had not been subjected to the decalcifying process. On cutting the sections from this block of tissue, many exceedingly fine, hard granules were encountered by the edge of the knife.

Microscopic Examination.—Under the low power the sections show a great preponderance of connective tissue over the parenchyma. This connective tissue has all the appearance of scar tissue in different stages of development. In some regions it is composed of old connective tissue with very few cells. In other regions, numerous blood-vessels and young connective-tissue cells are present. The greater part of this connective tissue is interlobular. Within this connective tissue dilated acini are seen, which are, in the main, devoid of mucous membrane lining, and about which there is a fairly active but chronic type of inflammation. In a small area of the section the connective tissue is distinctly intralobular. It shows a fairly active though chronic type of inflammation, and is associated with a somewhat dilated acinus, which, however, still contains a mucous membrane lining.

The true parenchyma of the gland is in the greater part arranged in definite lobules, and is practically normal in appearance, except in those few areas where there is an intralobular cirrhosis. A few islands of Langerhans, practically normal in appearance, are seen within the sections. Some of these lie within the secreting lobule, and others are isolated and lie within the connective-tissue overgrowth.

The general appearance of this specimen shows that it consists of multiple calculi of the pancreas lying in the finest acini of the gland and extending to the larger ducts. There is no evidence that these lie in or adjacent to the true secreting cells of the pancreas. Those calculi that

lie just beneath the capsule of the gland probably reached this position by producing a pressure necrosis of the overlying parenchyma.

Pathological Diagnosis.—Multiple calculi of the pancreatic ducts associated with a marked degree of chronic interstitial pancreatitis, chiefly of the interlobular type. It is impossible to state which of these two conditions (calculi or interstitial pancreatitis) is the primary condition.

I desire to point out certain facts based upon this case and a study of a number of cases of chronic pancreatitis due to calculus, in the literature. The state of emaciation in which the patient was presented is always found in chronic pancreatitis of long duration. In our opinion this is due, not so much to the absence of pancreatic fluid from the intestinal juices, as to the disturbance of function of all the digestive organs through their close nervous association. Pain is frequently felt in the left side. The pancreas is in direct relation with the left kidney and its pelvis. The patients' symptoms along the left ureter were no doubt due to this fact. Failure to get urine when the left ureter was catheterized during an attack of pain was probably due to a suspension of the function of the left kidney on account of its relation to the pancreas, which was at that time acutely disturbed. The fact that in the tissue removed the islands of Langerhans are seen to be well preserved and that no sugar was found in the urine, agrees with Opie's theory regarding the cause of pancreatic glycosuria. It has been established by Opie⁶ that pancreatic glycosuria is due to a destruction of the islands of Langerhans. Glycosuria therefore is not present in chronic pancreatitis until late in the course of the disease or during a severe and acute exacerbation.

A complete stoppage of pancreatic fluid had not occurred in this case, and there was no disturbance of the flow of bile, so that changes in the fæces were not noticeable. A hemorrhagic tendency was not present in this case. Some observers have attributed a hemorrhagic tendency to chronic pancreatitis when it should have been ascribed to a complicating cholæmia.

Though we propose to extend the operation just described to the treatment of all cases of chronic pancreatitis not relieved by gall-bladder drainage, it is particularly chronic pan-

creatitis accompanied by stone formation in the pancreatic ducts that we wish to consider at present.

Pancreatic lithiasis has been recognized since Graaf reported the first case in 1671. For many years it was the only condition in which chronic pancreatitis was known. It has not been successfully produced in animal experimentation, but its generally accepted cause is a catarrhal inflammation of the ducts and stagnation of secretion. Calculi are most often found in the duct of Wirsung and range in size from a millet seed to a walnut. The stones removed in Ruth's case weighed 280 grains.

In some cases a single stone the size of a bean may lodge so as to produce complete obstruction at the duodenal orifice of the pancreatic duct. This is followed by violent symptoms, an acute inflammation of the pancreas, glycosuria, and death in a few days from fatty degeneration. A review of a large number of carefully reported cases shows that this is the unusual type. Owing to the shape of the stone and the ability of the duct to expand, complete obstruction very rarely occurs. A partial obstruction, the most common condition, brings about a pathologic process extending over several years, during which time symptoms of greater or less severity are present. The inflammation first causes a considerable enlargement of the gland, which finally begins to contract and gets smaller and smaller, until at autopsy the pancreas may be only a thin covering to a dilated duct filled with stones. In partial obstruction the patient's condition takes a slow, chronic course, characterized by emaciation. Sometimes he is reduced almost to a skeleton; or before reaching this stage of extreme emaciation, death occurs from pulmonary tuberculosis and diabetes. Let me repeat that in chronic pancreatitis, diabetes always indicates either an advanced stage with destruction of the gland or an acute exacerbation of severe degree.

In a large number of cases stone formation is not confined to the ducts of Santorini and Wirsung. The dilatation of the main ducts extends along the smaller tributaries, and we find calcareous particles deposited even in the finest acini. This

condition I am pleased to call parenchymatous calculosis. Ziegler⁷ says of this condition: "Small concretions are sometimes diffused in the form of sandy grains throughout the gland substance." This must not be confused with those cases in which the main ducts are lined with calcareous material without the formation of calculi, designated by Robson⁸ as pancreolithic catarrh. Recognition of the type of calculosis at operation is important, as upon that depends the nature of the operative measures necessary. When stones are found only in the ducts of Wirsung and Santorini, they can be removed by pancreatotomy, as has been done by Moynihan⁹ and by Robson.¹ If, however, we have calcareous particles also in the small ducts and in the acini, to remove all of them is impossible. In that case we can only remove those stones in the main duct and establish permanent drainage by pancreatostomy, both to obtain the effect of the drainage on the inflammation always present, and also to be able to control the obstruction of the ducts by new stones that are sure to form.

Upon reviewing the operations done for stone in the pancreas, we find on record six cases reported by Gould,¹⁰ Allen,¹¹ Dalziel,¹² Moynihan,⁹ Robson,¹ and Ruth.¹³ Of these, four recovered, though one in whom simple pancreatotomy was done has since had return of symptoms. A bad result is most apt to occur from failure to get all the stones and to completely relieve the obstruction. It is plain that direct drainage by bringing the tail of the pancreas out and establishing a pancreatostomy is indicated in those cases where stones are found in the pancreas, unless only a few stones are present and their removal is feasible.

Owing to the rarity of this condition, one may not expect to be called upon to do this operation many times. However, an established technic for dealing with chronic pancreatitis and pancreatic lithiasis will encourage the performance of exploratory laparotomy in suspected cases of pancreatic disease and will assist in dealing with those unlooked-for conditions met on the operating table.

Pancreatostomy may also be used to prolong life in cases

of complete obstruction of the main duct from neoplasms. A dilated duct is not necessary for this operation, though it is present in most cases of obstruction at the duodenal orifice of Wirsung's duct. My experience proves that if a trench is cut in the gland, the bottom of which reaches and opens the duct, drainage is safely obtained if a tube is placed in the bottom of the trench and the gland substance closed around it. The fact that healing can occur between cut surfaces of the pancreas in the presence of its own secretion is established.

To the excellent experimental work on pancreato-enterostomy of Robert C. Coffey¹⁴ I am indebted for the impetus to perform pancreatostomy. One of the deductions made by Senn in his experiments on the pancreas was that complete section of the pancreatic duct results uniformly in obliteration of the duct at the site of section. For that reason I would prefer pancreatostomy, so that the duct can be kept patent, instead of pancreato-enterostomy as proposed by Coffey. This is especially necessary in the presence of lithiasis, where stones are frequently escaping and where without assistance, such as probing, the duct might become occluded anew.

The pancreas may be approached through the mesogastrium, through the gastrocolic omentum between the greater curvature of the stomach and the colon, and through the mesocolon. In my case I chose to operate through the mesocolon. Several repetitions of this operation, on the cadaver, have convinced me that the route through the mesocolon is preferable. It affords sufficient room for manipulation in the lesser cavity. It permits fixation of the pancreas in the lower angle of the wound, thus favoring drainage. If the pancreas is brought through between the stomach and the colon (Fig. 6), the greater curvature of the stomach, which normally varies much in its position at different times, would be fixed. The gastrocolic route possesses the sole advantage of permitting better exposure of the pancreas during operation. At another operation I would dispense with the gauze drainage around the pancreas, depending upon careful sewing and the fact that the tissues can dispose of pancreatic secretion if asepsis

obtains and no serious injury is added to the presence of the fluid.

Reports of death from chronic pancreatitis, both with and without pancreatic calculi, are not at all uncommon in medical literature. Invariably the cases were under observation over an extended period of time, and an approximate diagnosis was often made during life. It is our hope that the success of this operation may stimulate others to operate on those cases which heretofore have been considered beyond relief.

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ACUTE HEPATITIS SIMULATING STONE IN THE COMMON DUCT AND LIVER ABSCESS.

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THE studies of recent years in the pathology of the liver have resulted in a revision of the early conceptions of both parenchymatous and interstitial hepatitis. The disease has gradually been proven not susceptible to the simple classifications so long in use, and the various processes of inflammation, degeneration, necrosis, and regeneration have been so often found in one liver that the attempt to assign to a symptom complex, constant and characteristic lesions has been abandoned. Ideas have been modified very much, as in the case of nephritis. Experimental work has demonstrated the complex nature of liver changes and the part played in them by the various factors of infection, intoxication, autolysis, and regeneration; and autopsy findings have demonstrated how varied are the lesions associated with a given clinical picture. The terms "acute" and "chronic," "intralobular" and "interlobular" are no longer favorably regarded; cirrhosis is not considered a disease *sui generis*; still less is it admitted that the various forms of liver cirrhosis are distinct diseases. "All ground," says Kretz,¹ "for regarding cirrhosis as an entity, disappears." A place is reserved by some pathologists for the smooth, hypertrophic form with jaundice, which is regarded as sufficiently characteristic to deserve separate consideration. But Meyer,² and with him many modern pathologists, is unwilling to make even this concession, denying the existence of Hanot's cirrhosis as a distinct disease.

The newer views affect our conception not only of the interstitial but also of the parenchymatous lesions. It is now recognized that these, too, may be present in a given liver in the most varied form; and that there is no ground for ex-

pecting to find associated with a given symptom complex a constant, or even a characteristically predominating, parenchymatous lesion. Rokitsky's acute yellow atrophy seems to have survived criticism, as do the various types of syphilitic cirrhosis. But there is reason for the belief that even these types are not so sharply differentiated as had once been supposed.

In view of these facts there is no ground for the hasty assumption that new diseases have been established by finding "hitherto undescribed" hepatic changes.

The present cases, though associated with unusual lesions in the liver, are reported because of their clinical importance. They are examples of an uncommon disease and are of a good deal of diagnostic interest.

CASE I.—Weakness and loss of appetite, with vague abdominal pains for two years; jaundice and cough for three weeks; diurnal and bidaily chills (97.5° to 106.5°), with sweats and some pain in the right side; complete obstructive jaundice, unchanging in degree; enlarged, slightly tender liver; some nausea; negative Wassermann and Widal; purpura of the ankles; no malarial parasites. At autopsy, gall-bladder and ducts normal; no stones; liver enlarged; moderate degree of cirrhosis with diffuse necrosis of the parenchyme; no organisms (smear, sections, and blood culture): no syphilis.

The patient was a married woman of fifty, who had suffered for two years with vague pain in the right side. She had gradually grown weaker and had lost her appetite. Three weeks before admission she had "taken cold," and since then had been troubled by a cough. During this time jaundice had appeared and had gradually increased. She had complained of "uneasy feelings" in the stomach, but there had been no sharp pain, nausea, or vomiting. The bowels were regular. She gave a not very clear history of "some chills and fever." On the night of admission she had a shaking chill, accompanied by pain in the right side, and followed by a profuse sweat. The temperature rose to 105°, pulse 95, leucocytes 11,880. No malarial parasites could be found. The patient was extremely jaundiced and much emaciated. The tongue was heavily coated,

but there was no herpes. The abdomen was everywhere soft, but was fuller below the costal margin on the right than on the left side. The liver dulness reached 3.5 cm. below the costal margin in the R.M.L. During the next few days, the patient continued to have diurnal and bidaily chills, with sweats, headache, nausea, and palpitation. There was a muttering delirium when the fever was at its height. The jaundice persisted unchanged. The stools, which were acholic and fatty, contained

CHART I.

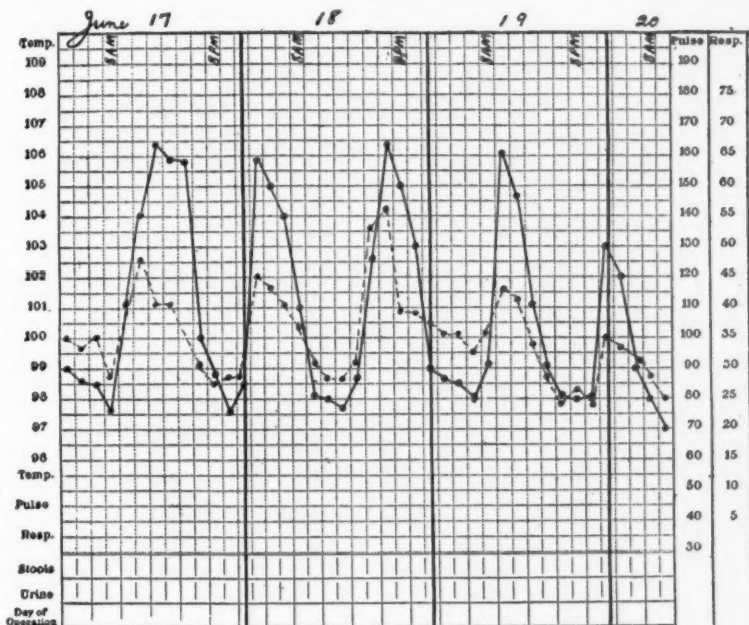


Chart showing pulse and temperature for a few days of the illness in Case I.

no blood. There was abundance of bile in the urine. Over the abdominal fulness in the right upper quadrant there was slightly increased resistance, but no marked tenderness or muscle spasm. The Wassermann reaction was negative. No variations in the jaundice or attacks of gall-stone colic occurred. The character of the fever is shown in the temperature chart (Chart I). At the time of the chills there was no particular abdominal pain, but tenderness was present in the right upper quadrant and extended into the flank. The gall-bladder could not be felt.

The Widal reaction was negative. Hæmoglobin 38 per cent.; coagulation time 6 min. Two weeks after admission purpuric spots appeared on both ankles. The patient was rapidly going down hill, and, though evidently too ill for an exploration of the common duct, it was felt that a palliative drainage of the gall-bladder might relieve the symptoms if due, in part, to infection of the bile-passages. At operation, the peritoneal cavity was found to contain a small quantity of bile-stained fluid. The gall-bladder and bile-ducts were normal. On the under surface of the liver there were numerous whitish-gray spots, which looked like minute abscesses and reminded us of a case of acute hepatitis seen shortly before (the second case here reported). Rapid closure was done. The down-hill course continued, uninfluenced by the operation, and the patient died two days later. At the autopsy the only findings of interest, aside from the liver lesions, were a slight excess of peritoneal fluid, firm adhesions about the spleen, between the liver and duodenum, and between the duodenum and right kidney. There was an acute splenic tumor, and a vegetation on the aortic valve, smears from which failed to show organisms.

The liver weighed 2800 Gm. and measured 31 x 24 x 7.5 cm. The outline was well preserved and the enlargement was uniform. There were dense adhesions on both diaphragmatic and lower surfaces. The capsule was not thickened, and through it one could see depressed scars. The lobulation was much obscured, in places could not be made out at all. Jaundice of the liver tissue was quite marked. The organ was like rubber in consistency and cut with some difficulty. On section the picture was pretty uniform throughout. The architecture was obscure; and in general the picture suggested a certain amount of cirrhosis. There were depressed scars with conspicuous raised areas of parenchyme, some of which measured 2 to 3 mm. in diameter. These nodules of parenchyme were of various colors (gray, yellow, red, green), or were quite opaque. There was apparently acute inflammation and necrosis of the liver tissue, with staining of all the elements with bile pigments. Cultures made at autopsy from the heart's blood showed no organisms either aerobically or anërobically.

Microscopically, the fat stains showed a large amount of fat. In parts of the liver, greenish or bronze-colored pigment was abundant. There was a wonderful grade of parenchymatous degeneration. This had affected all parts of the liver and almost none of the liver cells were normal. Some of them showed a granular or hyaline necrosis involving a part or all of the protoplasm. Others contained many vacuoles. Others were represented by a pink granular detritus. Poly-

morphonuclear neutrophiles were abundant, and there was much œdematous new-formed connective tissue. There were enormous numbers of new-formed bile-ducts. The capillaries were greatly congested, and large numbers of red blood-cells were present throughout the section.

CASE II.—*Malaria 25, syphilis 10, and pneumonia 8 years before admission. Onset of present illness two weeks before admission, with malaise, asthenia, and nausea; dull pain in right hypochondrium; fever (99.5° to 104.2°) and night-sweats; loss of twenty pounds; liver enlarged; tenderness in right upper quadrant of abdomen; Wassermann reaction positive; Widal reaction and blood culture negative. At autopsy, syphilitic aortitis; gall-bladder and ducts normal, no stones; diffuse cirrhosis of liver and necrosis; no abscess.*

The patient, a man of forty-two, had had a primary luetic infection with secondary symptoms ten years before admission. An attack of pneumonia eight years, and of tertian malaria twenty-five years, before were (with the exception of moderate constipation) the only other points of interest in the previous history. The present illness began suddenly fourteen days before admission, with general malaise, dizziness, weakness, and nausea following exposure to the wet. The following morning a dry cough developed and the patient began to experience a dull, aching pain in the right hypochondrium. He vomited once on the second day of the illness but not again. Fever, night-sweats and great weakness were the chief symptoms during the next few days. His appetite was fair, bowels irregular. A constant dull ache, worse at night and on deep inspiration, persisted in the right side. The pain did not radiate and there had been no attacks of colic. He had lost twenty pounds since the onset of the illness. He was moderately well nourished, with flushed cheeks, cyanotic lips, and a slight jaundice. Numerous medium râles were heard throughout the chest. The abdomen was quite tense throughout. At a point about 5 cm. to the right of the umbilicus there was tenderness, but none elsewhere. The respiratory movements were free and there was no muscle spasm. The spleen was not felt and there were no rose spots. The Wassermann reaction was positive, the Widal reaction and blood culture negative. There was a trace of albumin, but no casts in the urine. The liver was enlarged,

its border rounded. The character of the fever is shown in the temperature chart for the early days of the illness (Chart II). The symptom complex, together with a slight rise of the border of the lung on the right side, justified a probable diagnosis of liver abscess. At the exploratory operation, there was no fluid in the peritoneal cavity. The gall-bladder and ducts were normal. The liver was large, succulent, and covered with small grayish-

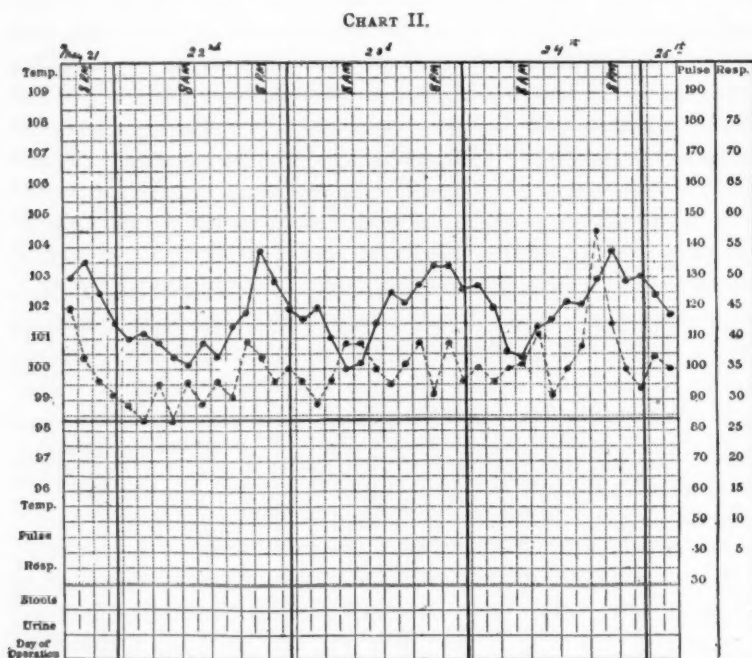


Chart showing the temperature and pulse for the early days of the illness in Case II.

white specks resembling abscesses. The liver was thoroughly explored with a needle but no pus encountered. During the ten days following operation there was extreme weakness, profuse perspiration, some distention, but no vomiting, and death occurred in extreme prostration.

At the autopsy, except for the liver lesions, the only features of interest were a slight enlargement of the spleen and a definite syphilitic aortitis. The gall-bladder and ducts were normal and there were no stones. The liver weighed 4000 Gm. and measured 30 x 20 x 9 cm. The capsule was thin. The organ was uniformly enlarged and its architecture

perfectly preserved. It was pretty uniformly mottled with opaque yellowish dots about $\frac{3}{4}$ mm. in diameter. The liver cut with some difficulty. The surface was not quite smooth, showing here and there irregular depressions evidently due to increase of connective tissue in the portal spaces. The liver lobules varied much in size, some being quite large and swollen and standing out beyond Glisson's capsule, others small and distorted. In many places the gross picture suggested pretty extensive necrosis. Smears made from a few small pockets, which contained grumous material suggesting pus, showed no pus-cells or organisms, and cultures made from the liver were sterile. Microscopically, the connective tissue of the portal spaces was everywhere increased and infiltrated with leucocytes, chiefly polymorphonuclears. The bile-ducts were much increased in numbers; all of them were dilated and filled with leucocytes and coagulated serum. In some places the ducts were so numerous as to suggest adenomatous growth. There was no degeneration of the lining epithelium of the ducts and no desquamation. The liver cells for the most part stained well, although they were swollen and granular. In many places they were atrophied, apparently by the pressure of the connective tissue. In places there was much brown pigment. In general, the pathological picture was not so striking as in the first case. Destruction of the parenchyme was less marked, increase of connective tissue more marked. More noticeable too was the great proliferation of the bile-ducts.

A small number of cases somewhat similar to these have been reported and the conclusion drawn that a separate clinical entity had been established. Curschmann,³ in 1899, described a specific form of hepatitis, with necrosis, based on the observation of two carefully reported cases.*

CASE I.—Woman of fifty-one, attacks of gall-bladder colic for one year; ten weeks before admission a mild attack, with loss of appetite, nausea, and almost daily vomiting; three weeks before admission jaundice, which had not been previously present even after the attacks of colic. Liver not enlarged, not tender; jaundice constant in degree; stools brown; moderate amount of bile in urine; irregular fever, only twice exceeding 39° ; pulse about 110; death ten days after admission. Autopsy: common duct thickened and enlarged; stone lying loose in common duct; abscess about cystic duct, with which it communicated by a perforation; liver slightly enlarged and showing numerous whitish spots, which looked like abscesses but contained no pus; diffuse central and midzonal necroses, with cirrhosis about the enlarged and proliferating gall-ducts.

CASE II.—Woman of forty-three, typhoid 12 years before admission; attacks of gall-stone colic, with jaundice, for two years; sharp attack,

* Incomplete reports of one or two other cases are also given.

with chill, three months before admission, followed by loss of appetite, frequent vomiting, alternating diarrhoea and constipation; temperature irregular, seldom much above normal; stools slightly colored; small amount of bile pigment in urine; jaundice practically unchanging in degree. At autopsy, gall-stones in gall-bladder. Cystic duct closed by a scar. Loose gall-stones in common duct, which was much dilated. Gall-bladder thickened and shrunken.

What Weber⁴ regarded as a similar condition, he reported under the title "*Hepar necroticum cum ictero*" (of Curschmann and Oertel). His patient suffered from deep jaundice, colorless stools, much emaciation, and ascites. There was a septic temperature. At autopsy a tumor of the head of the pancreas and dilated gall-ducts were found.

Extensive liver necrosis has been the feature common to the cases of Curschmann, Weber, and the author. The constant exposure of the liver to injurious agencies from the intestines, its double blood supply, the susceptibility of its cells to many mineral and proteid poisons, and its exposure to the effects of mechanical obstruction in the bile passages make such necroses not uncommon. The importance of infection in these processes has long been understood, but the part played by other factors is becoming clearer. Evidence is accumulating to show that the site of the necrosis within the lobule may be some indication of the cause of that necrosis. The association of a peripheral necrosis with pregnancy, for instance, is well known. Midzonal necrosis is regarded as so frequently connected with intense bacterial infection that the latter must be considered the most important factor in its production. In central necrosis, too, some form of acute infection must be regarded as the essential factor, though vascular disturbance may predispose to the lesion. The picture seen in a liver may, however, be altered by a combination of these factors. Opie,⁵ for instance, using a poison which *alone* would not cause midzonal necrosis, in combination with a relatively non-virulent organism (*B. coli*), was able to produce typical midzonal lesions. He thinks it probable that the organism retards the parenchymatous regeneration after destruction by the poison. Moreover, the picture has been shown

to change with the intensity of the intoxication and the time during which it acts on the liver. Flexner, using large doses of ricin and abrin, produced hepatic cell destruction without proliferative changes in the connective tissue; while smaller repeated doses of the same drugs led to the new formation of connective tissue and proliferation of the bile-ducts. Naunyn also showed that organisms introduced in large quantity into the ligated common duct might cause liver necroses, without any sign of suppuration, and that this rapid death of the liver cells might result fatally in seventy-two hours. Certain digestive or autolytic processes probably also play a part in the final pathological picture in some instances of hepatic disease. Salkowski⁶ and others have shown that the albuminous bodies of liver and muscle, under conditions in which bacterial action is excluded, are split into leucin, tyrosin, purin bodies, and albumoses, that this process may go on during life, and that it is probably of importance in explaining liver necroses.

The liver under conditions of disease may thus be exposed to the action of a large number of injurious agents. These agents may act singly or in combination; they may act intensely for a short, or mildly for a long, period; and a great variety of lesions therefore results. Many of these changes may be observed at one time in a given liver. If the common duct, for example, be occluded for some time, changes in the liver will be produced by the long-continued bile stasis. But infection may also be present and additional lesions be produced by the organisms. Finally, absorption of albuminous toxins from the intestines may modify the final picture. A liver examined at various stages in such a disease would present the most varied pictures—no one of which could be regarded as the "typical picture of biliary cirrhosis."

It is for reasons of this sort that attempts to establish sharply demarcated groups of hepatitis are unwarranted, and there is no evidence for the belief that the hepatitis described by Curschmann was a specific form. Both his patients had stones in the common duct. The first had a perforated cystic

duct with abscess; the second, gall-stones in the gall-bladder. Both had had repeated attacks of colic; jaundice was present in both cases, of long duration in the first case. The clinical picture was that of long-continued cholelithiasis, the liver changes probably contributing, as they often may, to the symptom complex in the last stages of the disease. The moderate degree of the jaundice and the fact that the stone was loosely lodged in the common duct hardly justify Curschmann's conclusion that the final clinical picture represented a distinct entity, referable to the liver rather than to the gall-stones. The effects of bile stasis on the liver are variable and the human liver is thought to be relatively resistant to this factor. Yet Janowski,⁷ in a study of the liver in ten patients dead of cholelithiasis, described one case which showed central necroses scattered throughout the liver—changes quite similar to those in Curschmann's cases. Experimentally, the effects on the liver of ligation of the common duct have varied with the animal used.

No bacteriological study of Curschmann's cases was made. Yet infection was obviously present and cannot be disregarded. Naunyn was able experimentally, by injection of *B. coli* into the ligated common duct, to produce extensive liver necroses. Curschmann's communication is only of value because it calls attention to the rôle played by the liver in the late clinical picture of cholelithiasis—a rôle often overlooked in the interest in the stones themselves. A similar criticism must be made of Weber's communication. His patient showed obstructive jaundice, ascites, enlarged liver, and fever; but inasmuch as an obstructing tumor of the head of the pancreas and dilated gall-ducts were found at the autopsy, the mere presence of multiple disseminated lobular necroses hardly justifies the consideration of the disease as a separate clinical entity.

In 1908 Oertel⁸ described in some detail four cases associated with a multiple, non-inflammatory necrosis of the liver, which he thought to be characteristic of the condition and similar to the lesions described by Curschmann. He applied

to the disease the name "*Hepar necroticum cum ictero*." The clinical picture, so far as one can gather from the meagre histories, was not characteristic. Jaundice and symptoms of intoxication (fever, mental disturbance, and delirium) seem to have been the chief features. All the patients were in a state of generally lowered nutrition, showed marked degenerative changes throughout, and had been exposed for some time to unhealthy modes of living. Common to all the cases was a peculiar and characteristic multiple and irregular destruction of the liver tissue, with more or less pronounced bile and blood stasis and fatty change. There was entire loss of the liver markings. The organ was leathery and pale yellow. There was a complete lack of inflammatory reaction within the liver tissue, and the sclerosis was confined to the portal spaces. The parenchymatous lesion appeared to be an unusual fading and gradual disappearance of the liver cells, with complete retention of the cell-outline, so that ultimately only "ghosts of cells" persisted.

Whether the changes described by Oertel are to be regarded as characteristic enough to entitle them to separate consideration is open to grave doubt. But, on the other hand, there is no doubt whatever that the clinical significance of extensive and relatively acute liver destruction—as illustrated by his cases and the cases reported in this paper—deserves emphasis, and this emphasis may be made without attempting to establish "hitherto undescribed" forms of hepatitis.

One of the interesting features of the cases here reported was our complete inability to demonstrate any cause for the hepatic change. The character of the temperature suggested an infectious origin, but blood cultures were negative, and no organisms could be found either in smears from the liver or in sections. The failure to obtain positive cultures from the liver has, however, only relative value. It was shown years ago by Babes⁹ that in patients dead of streptococcus septicæmia with extensive liver necroses, the organisms, though present in the blood, could not be grown from the liver; and that, in experimental streptococcus septicæmia, if the animals

lived longer than eight days after the injection, the organism could not be cultivated from the degenerated internal organs. There seems to be some reason for believing that this fact is due to the production of bactericidal properties from the albuminous molecule in the liver (Conradi).

Nor did the absence of signs of suppuration in the liver exclude infection, for the observation has been repeatedly made that organisms in large quantity may produce destructive parenchymatous lesions without the usual suppurative changes. It seems, indeed, altogether likely that these cases of destructive liver lesions, with fever and symptoms of intoxication, are often due to absorption from the intestines even when an infection cannot be absolutely demonstrated (Chauffard's toxi-infection).

In the second case here reported, the large, ulcerated, and thrombosed hemorrhoidal vessels must be thought of as a possible source for the infection. In some of the greatly dilated veins softening and ulceration of the thrombi had occurred, whereby the thrombus connected, through the ulceration, with the lumen of the gut. There was no sign of ileocolitis.

Syphilis cannot be disregarded in a discussion of acute destructive hepatitis with fever. The clinical features of this form of syphilis have been referred to by Gerhard, Frerichs, Hirschberg, Klemperer, and others, who have reported cases with fever either of the continuous or the irregularly remittent type; and Nasarow¹⁰ has made the point that the liver in these cases is almost always hypertrophic. Mannaberg¹¹ reported a patient who, on the basis of a malarial temperature chart, was treated for that disease for one and a half years; the fever disappeared rapidly with antiluetic treatment and complete recovery occurred. Osler and Churchman¹² include under Group 5 of their classification of luetic hepatitis cases resembling liver abscess. Unfortunately not a great deal is known of the pathology of these conditions, and the part played by lues has not been made absolutely clear by post-mortem examinations. In the cases reported in this paper, the pathological picture was quite different from that seen in

syphilis, but it is to be recalled that the old ideas in regard to luetic hepatitis are undergoing some change, and the ability to recognize the disease more often, by the Wassermann reaction, seems likely to make further changes still. Adami,¹³ for instance, while acknowledging the relative infrequency of the extensive diffuse liver lesions in the acquired form of the disease, states that "the lesions occurring in the congenital and in the acquired disease are identical, and that the same processes are at work in the secondary and tertiary stages; no sharp line between them can be drawn." Unfortunately, the failure to find the *Treponema pallidum* in the liver is of little value in excluding syphilis. Cases are reported (Veszprémi and Kaniz¹⁴ and Buraczynski) in which the organisms were present in considerable numbers in the specific skin lesions, but could not be found in the liver; and failure of this sort has been the general experience. Specific luetic liver changes have not been found in these cases, the diagnosis resting on the presence of other definite syphilitic processes or on the recent syphilis. The question might therefore be raised whether these were not cases of acute toxi-infectious hepatitis occurring in the course of syphilis, rather than instances of true luetic hepatitis. The complete response of symptoms to specific treatment in a group of clinically similar cases establishes the existence of syphilitic hepatitis with fever; but it unfortunately precludes the possibility of post-mortem evidence as to the liver changes in the cases known to be syphilitic.

In the two patients here reported the lesions in the liver were quite unlike those usually associated with syphilis. Sections stained by the Levaditi method failed to show the organisms of Schaudinn. In the first case, syphilis could be absolutely excluded, on the absence of infection, the negative Wassermann reaction, and the absence of syphilitic lesions in any of the organs at autopsy. In the second case, the patient had undoubtedly had syphilis, as shown by the positive Wassermann reaction and the presence of specific aortitis; but there is no evidence whatever that the liver lesions from

which he died were of specific nature. In view, however, of the unsettled state of knowledge in this respect, the Wassermann reaction is essential in patients exhibiting the symptom complex here described, and the therapeutic test should always be tried.

Acute yellow atrophy, though now recognized as occurring in a number of conditions, is still regarded as a definite pathological entity, and the early stage of the disease is sometimes associated with enlargement of the liver. This disease could be positively excluded in my cases by the gross and microscopic appearance of the liver, as well as by the absence of diminution in the size of the organ even in the late stages of the disease. Certain of the symptoms corresponded with those seen in the second (cholæmic) stage of acute yellow atrophy. Fever is not, however, a characteristic symptom of this disease; it is often, indeed, described as afebrile.†

The cases here reported illustrate the importance of a grave, acute disease associated with enlargement of the liver, some increase in the connective-tissue elements, and a high grade of parenchymatous destruction. The symptoms produced are jaundice, complete or nearly complete absence of bile pigment from the stools, fever like that seen in common-duct stone or in liver abscess, and manifestations of profound intoxication. Although the clinical picture suggested a bacterial origin, none could be demonstrated. Syphilis was excluded; but this disease, though usually producing changes in the liver quite different from those seen here, is known to cause hepatic lesions varying all the way from the common catarrhal jaundice to the "acute yellow atrophy of syphilis"; and some of the reported instances of luetic hepatitis have resembled clinically the cases in this paper. In view of the fact that liver changes of varied kinds—both as regards pathological picture and etiology—have been found in asso-

† Fever is often present during the initial catarrhal icterus, but later the temperature is, as a rule, normal. In the second stage it may become subnormal, though an agonal rise (sometimes very high) is often seen. Quincke in Nothnagel's System, Volume on Liver, Pancreas, and Suprarenal Glands. See also Kelly in Osler's "Modern Medicine," Vol. V.

ciation with this grave clinical condition, it is unwise to attempt to classify it pathologically and equally unwarranted to attempt to establish a close connection between this symptom complex and a "characteristic" liver change. Clinically, the condition is a very acute one, but in many cases chronic cirrhosis undoubtedly exists for a long time without producing symptoms, and is only recognized when (probably owing to some complication) grave symptoms supervene. So that even the word "acute" must be used cautiously in this connection. Icterus gravis primitivus describes, though somewhat vaguely, the clinical picture and takes account of the absence of demonstrable cause. Degenerative, productive hepatitis with enlargement indicates the main lesions and correctly emphasizes the element of destruction. Both names rightly imply the existence of an acute disease of the liver distinct from acute cloudy swelling, acute yellow atrophy, suppurative cholangitis, and liver abscess. The fact of the existence of such a disease is of more importance than its name; and its resemblance to liver abscess or stone in the common duct is of some importance in diagnosis.

Both cases were treated in the surgical service of Dr. Halsted, whose accustomed generosity with his clinical material it is again a pleasure to acknowledge. The second case was under the care of Dr. Thayer and Dr. Finney, who kindly allowed me to use it for study.

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THE RATIONAL TREATMENT OF ACUTE APPENDICITIS.*

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APPENDICITIS is a disease with which the medical profession has been familiar for many years. It has been carefully studied by many observers. Large series of cases have been gathered, and there is no lack of material for a comparative study of various methods of treatment. In spite of these facts, it must be admitted that there exists among surgeons and medical practitioners a great divergence of opinion as to the proper method of procedure in certain cases and at different stages of the same case.

The appendix in its anatomical relation differs from every other abdominal organ with which we have to deal. It is usually easily accessible. It can be completely removed, unless extensive surrounding disease be present, apparently without in any way interfering with the bodily functions. While we need not consider it a vestigial structure or a functionless organ, nevertheless its removal has in my experience never been followed by bad functional results of any kind. Its removal also is not usually a matter of great technical difficulty, unless complicating conditions place obstacles in the way of the surgeon.

Situated as the appendix is, more or less separate from other structures, it can yet give rise to most extensive inflammatory conditions within the abdomen. It is well known to be the most frequent causative factor in acute abdominal conditions requiring surgical intervention. Appendicitis is by far more frequent, in this country at least, than any other con-

* Read before the Philadelphia Academy of Surgery, February 6, 1911.

dition within the abdomen, acute or chronic, which is met with in surgical practice.

It seems strange then that since appendicitis is except in but comparatively few cases easily diagnosed, the organ so often accessible, and its removal, when no complications are present, so easy, that there should still be such a considerable mortality in dealing with acute appendicitis.

This mortality remains more than it should be for four reasons: (1) failure to diagnose the disease sufficiently early; (2) failure to recognize its gravity; (3) postponement of prompt surgical intervention; (4) incorrect treatment in the later stages of the disease.

The diagnosis of acute appendicitis has been sufficiently dwelt upon in many articles within the past twenty years. It is usually easy if a careful history has been taken and a careful examination of the patient made. I am convinced that most errors in the diagnosis of this, as well as of all other of the commoner surgical conditions of the abdomen, depend not so much upon any great obscurity of the symptoms as upon the failure of the medical attendant to carefully construct the clinical picture. Many of us have seen instances in which acute appendicitis has been treated under the impression that the pain was caused simply by gastritis or colic. The examination in such cases is most superficial, and indeed I have seen numerous instances in which a careful abdominal examination had not been made until two or three days had elapsed, or not at all. It is but rarely that the sequence of pain, vomiting, and tenderness, with localization of pain in the right iliac fossa, is not observed, and practically never are local signs absent. The only excusable way in which the physician or surgeon might fail to make a diagnosis, a few cases excepted, is in children too young to state their subjective symptoms or accurately to locate the pain and tenderness.

But while a diagnosis of acute appendicitis can and should be promptly made in practically every case, it is a false refinement of diagnostic methods to attempt to give a definite

prognosis early in the disease. We may of course gauge the comparative severity of the lesion by the severity of the onset, the patient's condition, and the rate of progress of the disease. Yet it must be remembered that often cases in which the symptoms are most severe do not show lesions more grave than those in which the disease apparently had started as a mild process. This leads us to the consideration of the second factor influencing the mortality of the disease, *i.e.*, a failure to recognize its gravity.

It has always been, and still is, my contention that every case of acute appendicitis seen early should have prompt surgical attention—operation, provided, of course, that no absolute general contraindication to operation is present, such as pneumonia or uncompensated heart lesion. There is no one who can say which case of acute appendicitis may progress to recovery and which go on to abscess formation or general peritonitis and death. This has been proved so often that we have no right to postpone operation in any case. It is true that a certain number of cases of acute appendicitis will recover spontaneously under proper non-operative treatment, only to have subsequent attacks. It is equally true that some unoperated cases will die. Could we but differentiate the two classes clinically, our line of procedure would be easy to establish, but, as has already been stated, such a differentiation is impossible. The only safe and proper course, therefore, is to resort to prompt operation when a case of acute appendicitis is seen early. The reason for referring all cases of appendicitis at once to the surgeon has been stated by no one better than by our well-known internist, Dr. M. H. Fussell, who speaks as follows: "I thoroughly believe that at least three-fourths of the cases of appendicitis would recover if not operated upon, but I know there are no symptoms that will tell when a case is approaching the danger line until it is extremely dangerous either to interfere or to wait."

The results justify such a statement. My mortality in acute appendicitis seen early, when the inflammation has been confined to the appendix, has been very small. I believe it

to be but little if any greater than that which is incident to an opening of the abdominal cavity whether a lesion be present or not. In 100 consecutive cases of this nature in 1910, from January 1 to December 31 inclusive, the mortality was nil. Surely such a result (and like ones are being obtained by many operators) justifies itself and puts beyond a doubt the fact that immediate operation is the only proper method of treatment to adopt in early appendicitis.

The third reason for our mortality arises from our failure to recognize and act upon this proved fact in every instance. Delay in operation is the most important causative factor in the mortality of acute appendicitis. The reasons for this are so well known and evident that I need not mention them. If the disease is attacked sufficiently early, the destructive and inflammatory processes are more likely to be limited to the appendix itself, and easily removed. When operation is delayed the infectious organisms have time to penetrate or extend beyond the walls of the appendix, enter the peritoneal cavity, and give rise to the grave conditions accompanying a peritonitis either diffusing or localizing. Could these cases be seen, diagnosed, and *early* sent to the operating table, acute appendicitis would be almost robbed of its dangers and become in the hands of competent surgeons one of the least formidable of abdominal diseases.

The fourth great cause for our mortality in acute appendicitis is the incorrect treatment in cases in which, for some reason or other, the disease has been allowed to progress beyond the confines of the appendix and we have to deal with an acute appendicitis complicated by a more or less severe inflammatory lesion of the peritoneum.

The treatment of the appendicitis becomes then not a question of the lesion in that organ, since this is entirely overshadowed by the secondary conditions to which it has given rise.

A correct understanding of the problem of peritonitis may be facilitated by the recognition of the fact that all cases of peritonitis belong, as Federmann so well states, to one of two

great groups—the progressing and the localizing. The former is that in which the tendency of the process is to rapidly spread until it has involved most or all of the peritoneal surface. The localizing type is that in which the process tends to the formation of a localized peritonitis or a localized abscess. The latter is peculiarly apt to occur in connection with appendicitis. We know, for instance, that all cases of peritonitis of the upper abdomen due to acute perforation of viscera are of the progressing type, whereas many cases of peritonitis following appendicitis are not.

But at the outset of any peritonitis, within the first 24 to 40 hours, it has been shown that the process is unconfined, that is to say, lying free between the coils of the intestine. The formation of a limiting wall of fibrin occurs only at a later stage.

Experience also has proved that any peritonitis at this stage is, with few exceptions, amenable to prompt surgical treatment. The results after operation, with modern post-operative treatment are excellent. Indeed the mortality in my hands has been lower than that of any other form of peritonitis with which I have had to deal, unless it be a strictly localized pelvic peritonitis from disease of the adnexa.

In the five years ending with 1909 I operated upon 63 cases of diffuse peritonitis within 40 hours after onset, with but one death in the series. Since then, in 42 consecutive cases of appendiceal peritonitis operated upon at the German Hospital within 40 hours of the onset of the peritonitis, I have had one death, making in all 105 cases with two deaths, mortality 1.9 per cent. While I feel that this is a low death-rate when the desperate character of the disease is taken into consideration, yet it is noteworthy that an extension of the time limit for immediate operation has been accompanied by a rise in mortality. This expresses a fact which I have definitely determined from my own experience, namely, that the mortality rises with amazing rapidity if diffuse peritonitis of whatever origin, when present for more than 40 hours, is treated by immediate operation. It is, no doubt, difficult to

say exactly when an appendicitis passes over into a peritonitis. Our guide must be an exacerbation of pain and tenderness in the right iliac fossa, followed by extension of tenderness to adjacent areas. In fulminating appendicitis it may be taken for granted that the peritonitis has taken its origin very shortly after the onset of the disease itself. I dread early perforations near the base of the appendix which give rise to a rapidly diffusing and severe form of peritonitis. In view of the importance which we place upon the duration of the peritonitis itself, it is necessary to hold clearly in mind that this time may be very different from the duration of the disease. In some cases when a temporizing policy has been adopted, a low grade appendicitis may smoulder for several days or longer before it lights up a diffusing process within the general cavity. The 40-hour limit also is somewhat arbitrary as demarcating the early period of relative safety in immediate operation. One case will be found almost overwhelmingly septic, while in another the march of the peritonitis and the increase in severity of systemic symptoms may be slow. This, however, in general may be taken as the period within which experience has shown that in practically all cases operation may be done and should be done in full expectation of success. I would not feel content if I did not qualify this statement by saying that occasionally in cases of even this short duration there will be found one who exhibits extreme prostration, with capillary stasis perhaps amounting to cyanosis, with a low leucocytosis or none at all, in short with all general and local symptoms pointing to a virulent septic process and low bodily resistance. It is not proper to operate upon such a patient. Mere anæsthesia may tip the scale against him. That these cases are not numerous can be seen from the figures which I have given above and the determination of the pros and cons of operation in such a case should be left entirely to the surgeon, preferably one of large experience in abdominal work. I cannot too strongly insist that these are refinements to be considered only by experts in this class of work, and affect in no way my general position in respect to the necessity for

operation in appendicitis. It deals only with the determination of the most favorable moment for operation, not with the advisability of operative treatment. I am thus explicit because it has been my misfortune recently to be placed in a false light before the public by reportorial garbling of technical statements of this sort which were not intended for the laity and are indeed impossible for them to comprehend in their true light.

It is a matter of agreement amongst surgeons, I believe, that early cases of appendiceal peritonitis, with the possible exception just mentioned, should be promptly operated upon.

When we come to consider an appendiceal peritonitis of more than 40 hours' duration, a different problem confronts us. While it has been the experience of all surgeons that early cases of peritonitis as a rule recover, such, unfortunately, have not been the results in peritonitis of a longer duration. Indeed, peritonitis, diffuse or general, has so far been the one great failure in abdominal surgery. Several conditions must be met under this head.

There may be found a peritonitis of the localizing or second form which frankly is making progress towards or has already reached the stage of local peritonitis or localized abscess. The condition of the patient in such an instance as to temperature, pulse and leucocytosis and general appearance always indicates that the organism is successfully combating the toxins resulting from the peritoneal infection. The temperature is but fairly high, 100° to 102° , the pulse strong though at times somewhat accelerated. The leucocyte count is always high and in most favorable cases over 20,000.

In such an instance immediate operation is indicated unless localization and subsidence of the general symptoms have been rapid, marked, and unmistakable. In the latter condition slight further delay would give the surgeon a still more favorable condition for operation. When improvement has reached a stand-still, operation should be done at once.

Again, we may encounter a peritonitis which, by the general condition of the patient and its favorable course, if it may

be so called, is evidently of a localizing type but does not as yet show the distinct signs of local abscess. In these cases we have two factors to guide us—the patient's general condition and the signs of an abdominal mass, even though not of a distinct local abscess. If the patient's condition be good, temperature, pulse, and high leucocytosis as indicative of high resisting power, operation is indicated if we have in addition some signs of a more localized process than is shown by the symptoms only of a diffuse peritonitis, that is to say, if in addition to general abdominal rigidity and tenderness localized in the right lower abdominal quadrant, we have in this area any portion which on careful examination gives the signs of an abdominal mass, however diffuse and indefinite.

When, again, in a localizing peritonitis the local signs are favorable but the general condition of the patient not good, our best course is to delay operation until the latter improves, treating the patient meanwhile under the methods later to be described.

The progressing form of peritonitis presents an entirely different clinical picture. We have in this form of the process also, two clinical aspects, *i.e.*, that one in which the patient's condition and resistance seem satisfactory, and that in which the reverse is true.

Concerning the treatment of this form of peritonitis,—one peculiar to appendiceal and occasionally other forms of pelvic peritonitis,—there has been a wide difference of opinion. We have stated that it is advisable to operate upon practically all cases of less than 40 hours' duration, and have indicated those cases of localizing peritonitis in which immediate operation seems the best form of procedure.

In progressing peritonitis with no signs of the limitation of the process, when the case is seen later than the first 40 hours delay is usually the best policy. This does not apply to other than appendiceal or pelvic peritonitis—in perforation of the upper abdominal viscera into the general abdominal cavity such a lapse of time practically always has brought the case to a hopeless condition.

Particularly must delay be insisted upon in those cases in which the patient's condition is evidently desperate. There can be no doubt that many such cases of appendicitis have been lost as a consequence of hasty operation. Those that will not improve upon proper treatment during delay and progress to an unfavorable termination do so even more quickly when hastily operated upon.

The question arises when to consider the condition sufficiently localized for operation. Delay until there is absolutely a sharply defined and outlined abscess is not necessary. The patient's general as well as the local condition must be our guide. Operation should be postponed until the temperature and pulse strike an equable level, the leucocytosis is consistently high,—showing good resistance to toxæmia,—and peristalsis is known to be re-established as evidenced by free passage of flatus. Then if we are able to discover the signs of a deep-seated mass or resistance in the right iliac fossa, operation will disclose as a rule a limited peritoneal inflammation.

Finally, when we have the symptoms of a diffusing peritonitis following appendicitis, the decision whether or not to operate must always depend upon the patient's general condition and upon a careful study of the case. It can be taken for granted, however, that when we have the classical symptoms of such a form of diffusing peritonitis,—rapid running pulses, abdominal distention, cyanosis, and the facies Hippocratica,—operation will be almost inevitably fatal and delay may save the patient.

A fact of importance in the consideration of localized collections of pus within the peritoneum is the possibility of leakage into the general peritoneal cavity from the wall of a previously well-localized abscess. The general or diffuse peritonitis which results from this occurrence is often of a particularly virulent type, and in many instances has a most rapid onset, occurring with great suddenness when the symptoms previously have been entirely favorable. The avoidance of this complication is possible only by prompt operation.

To this mode of treatment there could be but two objec-

tions. The first and most easily set aside is that from the theoretical point of view. It has been repeatedly stated that it is best to operate upon every case of peritonitis of the acute variety as soon as possible. No one indeed is more positive in the opinion that every case of acute appendicitis *per se* should be operated upon immediately than I am. But when a peritonitis has set in it becomes in reality a different disease. Appendicitis confined to the appendix is one thing—peritonitis following an appendicitis offers us an entirely different problem.

The statement is often made that a peritonitis is but a form of abscess and that it has been the universal experience that the best treatment for abscess or local suppuration is prompt evacuation and drainage. Pus within the peritoneum, when not seen early and when not sharply localized, differs somewhat from abscess or pus formation in every other portion of the body. Here our experience has often been that the evacuation, even by means of a small incision or puncture, of the enclosed pus is often followed by the rapid diffusion of toxins throughout the body and the death of the patient.

Buxton and Torrey, on the basis of animal experimentation, have concluded that the sudden so-called shock so often rapidly fatal after operations in fulminant peritonitis may be due to the explosive destruction of the bacteria by the immune substances of the body serum and liberation of their toxic contents into the circulation in large quantities. In other words, the too sudden destruction of virulent material within the peritoneal cavity may have even graver results than their activity while living.

From the practical point of view we can estimate the value of any one method of treatment only by the results. Personally, while I am cognizant of the great strides in post-operative treatment which have been made within the past few years, I am convinced that the more favorable results have been largely due to the selection of cases at the proper time for operation, and their proper pre-operative as well as post-operative treatment.

In the treatment of peritonitis both before and after operation, I have followed largely the method brought into prominence by Ochsner, with the addition of the Murphy method of enteroclysis.

When I see a patient suffering from a peritonitis as a result of appendicitis, the matter first to be considered is operation. If it be decided to postpone this, then the patient is treated in a way which we believe most often tends to conserve his strength and to bring about localization of the peritonitis.

One of the most important causes of the mortality in appendicitis, even among those who are believers in operation, is faulty pre-operative treatment. This is the true field of medical treatment in this disease, and I am certain that the procedures in common use among practitioners are responsible for a goodly percentage of deaths. It is a wellnigh universal custom to administer a purge in the early stage, and if recovery is not prompt to continue more or less drastic purging in the belief that it will favorably influence the disease. I must own that years ago I advocated this method, but I have long since been convinced that it not only does no good but does positive harm in many cases. The physician sees so many cases of colic or enteritis which respond readily to a simple purge that a false analogy has been drawn in respect to its efficacy in appendicitis. Except in those milder cases of catarrhal appendicitis which are only a part of an enteritis or colitis, it is difficult to see any great value in emptying the contents of the bowel, but it is easy to see that in the severe cases, to set up active peristalsis may mean to precipitate a perforation, to inhibit the formation of defensive adhesions, and to spread infective material throughout the peritoneal cavity. In the initial stage, before the diagnosis is readily made between simple colic and appendicitis and before the advent of local pain indicates that the inflammation has reached the peritoneal covering, it is inadmissible to give a rapidly acting purge, such as castor-oil or a saline. After the pain is localized and Nature is endeavoring by stiffening the surrounding muscles

to secure rest for the inflamed member, it is irrational to nullify her efforts from within, and every surgeon who has watched this point has observed that in general those cases that have been purged in this stage are likely to be more severe. If it is desired to move the bowels, enemata should be employed, but given gently, for a forced enema can be as objectionable as a purge. Quiet for the inflamed focus should be furthered by withholding all food and liquid by mouth, and all in this connection must mean all. An ice-bag over the right iliac fossa will cause the patient to lie more quietly in one position, will relieve the pain, and discourage too many examinations. The prevalent idea that it has any specific influence in abating the disease should be abandoned. It is wise to raise the head of the bed or better place the patient in a sitting posture in order to encourage the gravitation of fluid exudates or extravasations into the pelvis. Fluid for the body should be supplied by the rectal instillation of saline solution in intermittent or continuous form.

No morphia should be used, as the pain is rarely too great to be endured, and by its use the patient and physician are too often lulled into a false sense of security until peritonitis is too firmly established for any method of cure. An exception may be made to this rule when operation has been decided upon and the patient is suffering to an unusual degree from nervousness or pain. Then $\frac{1}{16}$ gr. to $\frac{1}{20}$ gr. morphia may be given and repeated once if necessary. If a little tact be used it is surprising how seldom anodynes are needed. Extreme degrees of suffering are not common in appendicitis.

Finally, all cases should be treated in the above manner, whether the medical attendant believes them to be serious or not. There is no way of differentiating the case that will get well from the one that will not. If equal care be used in all cases, the surgeon will rarely be requested to act in the capacity of Lord High Executioner upon patients moribund with peritonitis, and deaths in appendicitis will become rare.

Lavage to control vomiting and not medicine such as small doses of calomel, or calomel combined with cocaine, oxalate

of cerium or small doses of carbolic acid or dilute hydrocyanic acid, etc., any or all of which are not only useless but likely to aggravate and make the irritable stomach still more irritable. Medicines in this disease are out of place. If anything in medicine has been clearly proven, it is that appendicitis is a surgical disease, in fact the medical professor or internist, so called, should not be permitted to teach students the treatment of this disease unless he do so along the lines indicated in this paper.

The patient is given absolutely nothing by mouth until peristalsis is established; for it is a well-known fact that the smallest amount of food or even water introduced into the stomach gives rise to peristalsis, and peristalsis, however slight, must tend to prevent localization of the peritonitis. It is sufficient for the patient's comfort to keep the mouth moistened with a cloth. The patient's bodily strength is kept up by the use of continuous saline enteroclysis, continued as long as it is well borne, and at times interrupted for longer or shorter periods. I have found this to be of greater value than the use of saline enemata at stated intervals, even when they contain supposedly more highly nutritious substances in solution. The false, erroneous, absurd idea that patients with acute abdominal inflammation must be given nourishment by mouth has long since been disproven.

Continuous enteroclysis has been most largely used as a method of post-operative treatment, but I have found it of equal value in peritonitis prior to operation.

When vomiting occurs, it can be controlled by prompt and thorough lavage, repeated as often as may be necessary. This is a most essential part of the treatment, for putrefying food within the stomach or regurgitated into it gives rise to virulent toxins and ptomaines, having a profound depressant action upon the bodily economy as a whole. Lavage is also to be employed when there is *great* distention of the stomach, hiccough, or nausea, or the spitting up of small amounts of dark fluid. These as well as frank vomiting are the evidences of retention and regurgitation of putrefying material in the

alimentary tract, and call for the prompt use of the stomach tube until the condition is relieved. This also is most useful as a preventive of a possible acute gastric dilatation which I believe to be infectious or toxic.

In addition the use of the ice-bags externally allays pain and seems in a degree to inhibit active peristalsis.

Opium and opiates I use most sparingly in the treatment of peritonitis. While opium and its derivatives stop peristalsis, they do so in a manner which soon produces complete paralytic ileus, with its accompanying obstruction, retention of toxins, etc. The relief of pain also is not to be considered as a prime factor in comparison to saving the patient's life. Moreover, this complete dulling of pain produced by morphine is most deceptive and often makes it impossible to determine correctly the stage of the disease under treatment or its progress. When the patient is in extreme pain or so restless that he cannot be controlled by other means, which is rarely the case, I employ morphine in doses of $\frac{1}{20}$ to $\frac{1}{16}$ hypodermically, repeated once if necessary.

The operative technic which I employ in cases of peritonitis associated with appendicitis is that of any other peritonitis. The use of protective pads is most important to prevent the spread of infection. The appendix is always removed except when a circumscribed abscess is present and its removal would be attended by too great danger of diffusing septic material. Lavage of the peritoneum I consider not only useless but harmful. It is my practice to remove the pus by the gentlest means and with special care not to disturb the coating of plastic and protective lymph which is often found on the bowel serosa. It is not this lymph which causes subsequent adhesions. These can most often be attributed to rough handling of the bowel during operation, or the trauma of pads or instruments.

Drainage should be by tube whenever possible. I have found split rubber tubes with a gauze wick serviceable, if the tube be sufficiently rigid to preserve its calibre. Cigarette drains are useful only when there is but little need for drain-

age. I would call your attention to the importance of pelvic drainage in cases of peritonitis. By this I mean drainage by means of a glass tube introduced into the pelvis through the incision, or through a stab wound over the pelvis. When, after operation, the patient is placed in the sitting posture, all fluid in the abdominal cavity will gravitate to the pelvic area, and it is this even more than the operative field that we want to drain.

After operation the patient is placed in the sitting position, and the treatment is practically as before operation.

In conclusion I would say that if there is one fact in the field of medicine which has been demonstrated conclusively, it is that the rational treatment of acute appendicitis is in operation, early and immediate if possible; late, postponed, or absolutely contraindicated only by the presence of other conditions which may be complications of the disease itself or entirely independent of it, mere coincidences which render the performance of any operation too hazardous. Advice other than this no man has a right to give.

The following table illustrates the results obtained by this method of treatment during the year 1910 in the German Hospital and in the Children's Hospital of the Mary J. Drexel Home.

		Deaths	Mortality
Number of cases of acute appendicitis.....	315	9	2.85
German Hospital	235	7	2.97
Mary J. Drexel Home (Children).....	80	2	2.5
Number of cases acute appendicitis, no peritonitis..	100	0	0
German Hospital	80		
Mary J. Drexel Home	20		
Number of cases appendicitis with peritonitis.....	215	9	4.13
German Hospital	155	7	4.51
Mary J. Drexel Home	60	2	3.33
Number of cases with diffuse peritonitis.....	74	6	8.1
Number of cases with localized peritonitis.....	66	1	1.51
Number of cases with serous fluid	39	0	0.00
Number of cases indeterminate at operation.....	16	1	6.25

CHRONIC APPENDICITIS.

A CRITICAL STUDY OF POST-OPERATIVE END RESULTS.

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CHRONIC appendicitis is a disease ideally suited for surgical treatment. The operative technic is settled, simple, and safe. The postoperative convalescence is rapid and easy, no important organs or physiological functions are interfered with or disturbed, and the cure in real cases is absolute.

Kehr has, however, very aptly said that a living patient who has received no permanent benefit from an operation is a living, talking, unforgettable advertisement of failure, and any considerable proportion of such cases must soon condemn an operative procedure, even though the average results obtained are considerably better than those reached by other means. That the end results in cases operated upon for supposed chronic appendicitis have not thus far been altogether satisfactory, is attested by the fact that in almost every community there are more or less numerous patients who have had their appendices removed, with no improvement in their symptoms. This is partly accounted for by the fact that chronic appendicitis has been the especially selected playground of the amateur surgeon, but there is abundant evidence that a large proportion of the uncured patients have left the operating tables of surgeons whose standing is unquestionable.

That in the future these results can be considerably improved admits of no doubt. Such improvement must come largely through careful study of the successes and failures of the past, and the investigation upon which this paper is based was undertaken with the idea that the knowledge so gained might enable us to eliminate a certain proportion of the unsatisfactory late results. This study has consisted of a review of the literature on the subject, together with a critical analysis

of the end results attained by my associate, Dr. C. G. McMullen, and myself in 100 cases operated upon under the clinical diagnosis of chronic appendicitis.

DEFINITION.

Chronic appendicitis has usually been considered under the three following heads:

1. Recurrent appendicitis, in which the patient suffers from well-defined acute attacks with intervals relatively symptomless, the operation being performed to prevent subsequent attacks.

2. Relapsing appendicitis, in which the patient has suffered from one or more well-defined attacks, never having recovered normal health in the intervals.

3. Chronic appendicitis, the term including those chronic symptom-producing conditions of the appendix, in which definite attacks of acute appendicitis have either never occurred or at least do not constitute an easily recognizable part of the clinical picture. Patients in this class seek relief, not from the acute attacks but from the more or less serious gastrointestinal symptoms, pain, or other discomforts due to an abnormal condition of the appendix.

The older literature on chronic appendicitis refers almost entirely to interval operations in the recurrent type, but within recent years the term has been more and more limited to the third class of cases, and it is to this latter type of appendicular disease that the present study has been chiefly directed.

PATHOLOGY.

Considerable confusion exists in the literature concerning the pathological changes found in cases of chronic appendicitis. Most writers who have based their opinions chiefly on microscopical findings without reference to the clinical symptoms have dwelt largely upon certain so-called catarrhal changes in the appendix, but the writer, in a pathological study of over 2000 appendices, has been unable to correlate the finer micro-

scopical changes with the clinical symptoms in the chronic cases. In my own experience the essential pathological changes have been studied satisfactorily only at the operating table, where all conditions which may interrupt the free drainage of the appendix are open to observation. Almost without exception, symptom-producing appendices are associated with anatomical conditions interfering directly with the free drainage of the appendix, and as a rule the more permanent the occlusion the more constant or frequent the clinical symptoms. Conversely, so-called catarrhal appendices without demonstrable obstruction have seldom produced clinical symptoms referable to the appendix.

Actual obstructions may be due to cicatricial strictures within the appendix itself, or to fecal concretions or other solid bodies, or to malpositions of the appendix caused either by a short mesentery or by adhesions the result of developmental or previous inflammatory conditions.

SYMPTOMS.

Probably in no other well-recognized surgical condition occurring within the abdomen does the literature show such utter confusion regarding the symptomatology. Following the paper on "Appendicitis Larvata" published by Ewald in 1899, almost every conceivable abdominal ache or pain and every imaginable variety of indigestion have been ascribed to chronic appendicitis or appendicular dyspepsia. Even as late as 1910 we have Moynihan's article on appendix dyspepsia so vaguely written, that, as Bowlby has aptly pointed out, one might infer from it that all forms of indigestion are caused by the appendix. All of this reminds one of the confusion which existed a few years ago concerning the symptomatology of gastric and duodenal ulcer, and it is to be hoped that in a few years we may have a type picture of chronic appendicitis at least approaching in clearness of outline that of duodenal ulcer or gall-stones. The recently published study of Graham and Guthrie goes far toward clearing up some of the confusion,

and their findings correspond quite closely with our experience in our cured cases.

In studying the symptoms of appendicular dyspepsia I have made use of two groups of cases: the chronic appendix cases, 51 in number, in whom the symptoms of indigestion were cured by removing the appendix; and a control group of 33 patients operated upon for acute appendicitis, but who after operation found themselves cured of a long-standing chronic dyspepsia. The character of the indigestion was the same in both groups, and although individual patients may differ in their description of the symptoms, the type picture of the essential features is apparently quite constant.

Many of those operated upon for acute appendicitis state that the final attack began like their old attacks of indigestion, but that instead of soon letting up the pains grew steadily worse, and that before long the telltale right inguinal pain was added to the acute indigestion and then followed the diagnosis of acute appendicitis. In studying the symptoms of appendicular dyspepsia we must, therefore, bear constantly in mind the early symptoms of acute appendicitis.

Previous Attacks of Acute Appendicitis.—Forty-seven out of 64 or 73 per cent. of our cured cases give a history of having had at some previous date acute abdominal illnesses, usually referred to as acute indigestion, gastritis, or bilious attacks, but on close analysis presenting the classical picture of an acute appendicular illness, namely, rather severe sudden epigastric, umbilical, or general abdominal pain, soon accompanied by nausea or vomiting, and later followed by pain or soreness in the right inguinal region, and a period of partial or complete incapacity for work.

Indigestion.—Of our 64 cured cases, in 51 chronic indigestion was the chief cause of complaint, and of the remaining 13, 11 gave a history of having had attacks of acute indigestion, the symptoms of which were interpreted as being really those of acute appendicitis. Thus in only two cured cases were the symptoms solely those of right inguinal pain, and in one of these patients the right tube and ovary were also removed.

Pain.—Pain is the most constant symptom of the acute attack, but the first pain is only in rare instances referred to the right inguinal region. The primary pain is almost always located in the epigastrium or mid-abdomen, and it is only after some hours or until definite inflammatory changes are well advanced in the appendix, that the patient complains of pain in the right lower quadrant. Similarly in our cured cases of chronic appendicitis, the pain has been almost constantly referred to as epigastric or mid-abdominal rather than right inguinal. On the other hand, nearly all the patients not benefited by operation complained of right inguinal pain as one of their chief symptoms.

Graham and Guthrie state that, given attacks of dyspepsia accompanied by epigastric pain with radiation to or about the umbilicus or lower abdomen, we must hold first and clearly to appendicular disturbance, and this statement agrees perfectly with our experience. We may call this pain a pylorospasm, or we may account for it as best suits our fancy, but it is apparently analogous to the early pain of the acute appendix attack, and its presence in real cases of chronic appendicitis is so constant that its absence in the history of a suspected case should lead to a grave doubt as to the accuracy of the diagnosis. Such attacks of epigastric or mid-abdominal pain or distress were present in over 96 per cent. of our cured cases.

Epigastric or mid-abdominal pain is also a prominent symptom in a number of other abdominal diseases, but a carefully analyzed history will allow of a differentiation in most cases.

In gastric and duodenal ulcer we have a clean-cut regularity in the symptoms not observable in appendicular dyspepsia. In ulcer, before secondary complications have intervened, the intervals between the attacks are free from symptoms, and during the attack the pain comes on at a regular interval after each meal. Food gives temporary relief and alkalis are similarly effectual. Later, as complications intervene, much of this regularity is lost, but the early history is always attainable and the onset of complications is usually accompanied by evidences of food retention.

In gall-bladder disease we have the sudden onset and almost equally sudden relief, with the characteristic radiation of the pain, or in the absence of real pain we may have the sudden attacks of gaseous pressure relieved by belching, slight vomiting, or regurgitation. The patient as a rule notices no definite relation to food intake, the periods of disability are usually short, and the intervals are, as a rule, free from symptoms except as regards hyperacidity in some cases.

In chronic constipation the distress or pain is of a diffuse character, with areas of special intensity corresponding to points along the colon. Increase of pain or distress is directly referable to the degree of constipation, and the trouble is temporarily relieved by catharsis.

In enteroptosis the pain varies greatly in individual cases, bears a definite relation to fatigue, and gas is associated with the characteristic physical type and neurasthenic tendencies.

In appendix dyspepsia the first pain of an attack may come on without warning or may follow an indiscretion in diet, but during the subsequent period of disability, food intake is regularly associated with an increase of distress or pain. The pain is irregular as to time of onset and may appear any time, from a few minutes to an hour or more after eating, and may be manifested only as a peculiar epigastric distress, or attacks of quite severe abdominal pain may be followed by days or weeks in which the patient is afraid to eat because each meal is liable to be followed by a peculiar, tenacious distress of such a nature as to convince both the patient and the examining physician that there is something definitely wrong at some point in the intestinal canal.

Nausea.—Next to the pain and epigastric distress, nausea has been the most frequent symptom in our cured cases. As the pain increases in severity, nausea becomes a prominent symptom, and with painful attacks approaching in intensity the pain of acute appendicitis, nausea and vomiting become the rule. While actual vomiting is confined largely to the more severe painful attacks, nausea seems to be far more common than in gastric ulcer or gall-stones; nausea is the rule

during the height of the attacks, and frequently is the most constant and distressing symptom complained of by the patient. Ochsner has called attention to the fact that this symptom is especially frequent in cases where the appendix contains a large fecal concretion.

Constipation.—Most writers have spoken of constipation as one of the chief symptoms of chronic appendicitis, but in our cured cases constipation has not been more prevalent than in the ordinary run of office patients, and removal of the appendix has had no constant effect upon this condition. As will be noted later, a large group of uncured patients with pain in the right lower quadrant suffered from chronic constipation, and neither the pain nor the constipation was benefited by removing the appendix. Several patients who sometimes had spells of sudden diarrhoea, following soon after the onset of their painful attacks, were cured of the diarrhoea after removal of their appendices, a fact previously noted by Ewald and others.

Gas.—In our earlier records, gas and distress are often used without special differentiation, but we have come to realize that in chronic appendicitis the distress usually bears no particular relation to gas, and although discomfort from gas makes up part of the general picture, it is a far more characteristic feature of our uncured than of our cured patients.

Appetite.—The appetite often fails during the height of the attack, but for the most part our histories in the cured cases record the fact that the appetite is good but the patient is often afraid to eat because of the subsequent distress.

Taking the 64 cured patients as a group, we are at once struck by the fact that 62 complained of attacks of epigastric or mid-abdominal pain or distress. Forty-seven stated that they had one or more attacks in which the primary pain and nausea were also accompanied by pain or soreness in the right lower quadrant, a fact which aided materially in the diagnosis, but even in these patients the subjective symptoms directly referable to the region of the appendix constitute but a minor part of the total discomfort. On the other hand, our uncured

patients almost without exception complained of pain in the right lower quadrant as their chief symptom.

It is altogether probable that the symptoms of so-called appendiceal indigestion are caused by the same abnormal condition which is the predominating factor at the onset of the acute attack, namely, an obstruction interfering with the free drainage of the appendix, and that as long as the lesion remains a mechanical one the pain or discomfort is referred to the mid-abdominal region. On the other hand, it is a well-known fact that, with the onset of active inflammatory changes in the appendix, we have pain subjectively referred to the region of the appendix. In those who escape the acute inflammatory attacks, the subjective symptoms may be entirely referred to the epigastrium or mid-abdominal region, but, in the majority of patients, occasional attacks will probably lead to active inflammatory changes in the appendix and an accompanying pain or soreness in the right lower quadrant.

Gall-stones.—Previously undiagnosed gall-stones were found in three men and one woman operated upon for chronic appendicitis. Cholecystectomy in addition to the appendectomy resulted in a cure in each case. All of these patients had definitely diseased appendices, but when the histories were again taken after the operation, it was found that in each, the gall-bladder had undoubtedly been responsible for its share of the symptoms. This error in diagnosis is of little practical importance, provided the gall-bladder is routinely examined each time the abdomen is opened.

UNCURED CASES.—Our uncured cases, 36 in number, may be divided into several well-defined groups, a study of which will, I believe, illustrate some of the errors frequently made by both the surgeon and general practitioner.

Movable Cæcum Group.—This is the largest group and comprises 16 cases, all of whom were characterized at operation by a long, movable cæcum without any very definite changes in the appendix. Although before operation the enteroptosis had not been clearly recognized, a re-examination after operation shows that the majority of them belong to the

physical type so commonly associated with Glénard's disease. None of these patients was permanently benefited by the operation, although nearly all of them were apparently much benefited for a few weeks or months, a fact probably accounted for by the enforced rest and careful diet incident to the operation and convalescence.

Viewed as a group, the histories differ strikingly from those of the cured cases. Previous attacks with symptoms corresponding to acute appendicitis are mentioned in only two histories, while in none of the patients in this group was epigastric or mid-abdominal pain a prominent feature. On the other hand, pain in the right lower quadrant was the ever-present symptom which induced these patients to seek surgical relief. Chronic constipation is usually associated with the pain, and gas is a far more noticeable symptom than in the cured cases. Fatigue is often given as a cause of increased pain.

During the past two years Wilms, Wiemann, and Stierlin, in Germany, and Cheinisse, in France, have each published papers dealing with the movable cæcum in its relation to the diagnosis of chronic appendicitis, and Wilms has devised a most ingenious method for fixing the cæcum, by means of which he claims to have had excellent results. Stierlin, in an exhaustive paper on the subject of movable cæcum, has recently reported the end results in 43 cases operated by Wilms, with 75 per cent. of complete cures, a number of the cured cases having previously had their appendices removed without benefit. In the older literature on this subject, we find Edebohls, who believed that 80 or more per cent. of movable kidneys were associated with symptoms of chronic appendicitis. Also the paper of Blake, who shows that a movable cæcum may be the cause of real appendix trouble.

Lane has recently called attention to certain adhesion-like bands, which may be present in these cases and cause symptoms by obstructing the ileum close to the cæcum. The real importance of Lane's kink, which has recently attracted considerable attention, has not yet been determined, but the possibility of its presence should always be borne in mind.

No especial difficulty should be encountered in properly diagnosing this class of cases, provided one bears in mind the absence of any previous well defined appendix attacks, together with the absence of epigastric pain or distress as a prominent symptom, and gives due consideration to the chronic constipation and the objective evidences of enteroptosis and dilated cæcum.

Kidney Lesions.—Three men in our series not cured by appendectomy subsequently developed typical attacks of renal colic, and it is possible that renal obstruction may have been a cause of symptoms in several of the uncured women. A careful history, aided by the X-ray and the cystoscope in all suspicious cases, should make a differential diagnosis between kidney and appendix lesions possible in most instances. It is a fact, however, that in the past a very large proportion of patients suffering from intermittent hydronephrosis have had their appendices removed without benefit, and it is only by the most conscientious use of all diagnostic aids at our command that we can hope to escape similar errors in the future.

Psoas Spasm.—Two patients not cured by appendectomy apparently suffer from some lesion involving the psoas muscle, the trouble being associated with painful contractures of the right psoas which can be readily palpated in each case. In these patients the pain is chiefly related to muscular exertion, and flexion and adduction of the right thigh gives partial relief. Operation was undertaken with the idea that an adherent appendix might be the cause of the trouble, but no lesion of the appendix was found in either case.

Hysteria.—Two uncured patients developed typical symptoms of hysteria soon after operation. If we bear constantly in mind the possibility of this error very few mistakes should be made. It must of course be borne in mind that appendicitis may be the existing cause of hysteria.

Tuberculosis of Mesenteric Lymph-nodes.—Tuberculous mesenteric lymph-nodes were found in one case in which the appendectomy did no good, but the positive diagnosis made possible by the laparotomy was of sufficient value to justify

the operation, and under very rigid hygienic treatment, this patient has remained in good health since the operation.

Miscellaneous.—In twelve patients the symptoms still complained of are of such indefinite nature as to leave the diagnosis in doubt. Appendectomy undoubtedly benefited several of these patients, but they still consider themselves far from cured.

SUMMARY.

1. The majority of patients suffering from chronic appendicitis give a history of having had one or more attacks of acute abdominal illness, with a sequence of symptoms recognizable as those of an acute appendix attack, namely, sudden severe abdominal pain, usually beginning in the epigastrium or mid-abdomen, accompanied by nausea and vomiting and followed by a period of pain and tenderness in the right lower quadrant.

2. In our experience appendiceal dyspepsia has been characterized by symptoms strikingly analogous to the earliest symptoms of acute appendicitis, namely, attacks of epigastric or mid-abdominal pain or distress only rarely accompanied by subjective symptoms referable to the region of the appendix. During those attacks the pain or distress is nearly always increased by food intake.

3. Pain confined chiefly to the right lower quadrant and not associated with attacks of epigastric pain and nausea is seldom due to the appendix, and before making a diagnosis of chronic appendicitis in these cases every other possible condition should be excluded.

4. The majority of our failures have been in patients complaining of right inguinal pain associated with chronic constipation. At operation these patients have presented an unusually long or dilated cæcum, usually accompanied by other evidences of enteroptosis. In the future a certain proportion of these patients may be cured by some such operation as that advocated by Wilms, but appendectomy alone does not cure.

5. Unless the diagnosis is absolutely certain, the gall-bladder, stomach, and right kidney should be explored, and the possibility of a Lane's kink excluded in all cases operated upon for chronic appendicitis.

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SOME OBSERVATIONS UPON THE SURGERY OF THE URETER.*

WITH A BRIEF REPORT OF THIRTY-ONE CASES.

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THE development of surgery of the ureter was made possible by the introduction of the cystoscope and ureteral catheter. Before the employment of these aids to diagnosis, pathological conditions of the ureter were rarely recognized, and their symptoms generally attributed to lesions of the kidney or bladder.

While the first crude instruments devised to obtain knowledge by direct inspection of the bladder mucosa and ureteral orifices served to awaken the interest of the profession in ureteral disease, it was not until 1891, when the catheterizing cystoscopes of Nitze and Casper were introduced, that a systematic study of the lesions of the ureter was undertaken.

During the past twenty years much has been added to our knowledge of these conditions, and many operative procedures have been devised and practised for their relief.

While the number of diseased conditions of the ureter requiring relief by surgical operation is limited, and while few surgeons have acquired a large experience in these procedures, still at the present time it may be stated, that most surgeons are encountering an increasing number of these operations; and, for this reason it seemed to the writer, that the present meeting of the society might with profit be devoted to a discussion of the various procedures employed in treating some of the more common conditions, which would be mutually helpful.

* Read before the New York Surgical Society, March 22, 1911.

With a view to opening this discussion, I will give a brief review of the methods I have employed and the results obtained in the few cases of ureteral disease that have fallen under my personal care, in the hope that I may glean from your discussion facts which will enable me in the future to avoid some of my earlier mistakes.

In reviewing my case histories, I find that I have records of 31 patients presenting symptoms of ureteral lesions, in which operations were undertaken or seriously considered. The actual number of operations performed by me for the relief of the ureteral lesions or their sequelæ was 34. This does not include a number of operations performed without relief by other surgeons before the patients came under my care. Several of these patients presented more than one lesion.

The cases may be classified as follows: congenital malformations, 2; traumatic rupture, 1; ureteral fistulæ, 4; strictures due to aberrant arteries, 2; strictures due to inflammatory exudates, 3; strictures due to faulty implantation into renal pelvis, 1; ureteral calculus, 17; symptoms and signs of ureteral calculus, no stone found at operation, 3.

CONGENITAL MALFORMATIONS.

CASE I.—The patient was a young man, twenty-eight years of age, who complained of two attacks of right-sided colic lasting several hours; blood and albumin in the urine, tenderness in the right renal region.

X-rays showed small, clearly defined shadow just below right kidney. On operation the following conditions were revealed: (1) aberrant renal artery leading to upper pole, rendering delivery of the kidney extremely difficult; (2) a thin-walled perirenal cyst, which was ruptured during the manipulations necessary to effect delivery of the kidney; (3) double renal pelvis and ureter, which, however, fused about four inches below the kidney; (4) hydronephrosis of upper pelvis and ureter, lower pelvis and ureter normal.

Upper pelvis opened and calices explored, with negative result. Small hard body palpated in upper ureter just above its junction with lower tube. On exploration this was found to be

a soft calculus, which was removed. Ureter catheterized and found to be patent. Ureteral wound closed, kidney replaced, and abdominal wound partly closed by layer suture and drained. The operation was exceedingly difficult, long, and accompanied by considerable shock.

Patient complained of severe constant pain for fourteen days, accompanied by an irregular temperature, progressive asthenia, and signs of infection of the kidney. It was finally decided to reopen the wound for exploration. A large œdematous kidney was found which was the seat of numerous septic infarcts. Nephrectomy, followed by prompt recovery.

CASE II.—A boy, aged twenty years, was referred to the writer by Dr. W. H. Murray of Plainfield, suffering from a urinary fistula in the right inguinal region. Several months before this he had been operated upon for supposed acute appendicitis. The operation was a difficult one and associated with considerable hemorrhage, necessitating the use of numerous clamps, some of which were left temporarily in the wound. After rather a stormy convalescence, urine was observed to flow from the wound in considerable quantity. One or two subsequent efforts were made to close the fistula but without result. On examination, a scar of the previous operations was found in the right inguinal region, in the centre of which was the opening of the fistulous tract, which on probing was found to lead backward and toward the median line. Here on careful palpation there could be felt a mass which seemed to be a rather small, malformed ectopic kidney.

Cystoscopy and ureteral catheterization by Dr. Osgood demonstrated normal urine from the left ureter. The ureteral catheter could only be passed a short distance into the right ureter, and from this no urine could be obtained.

Under ether anæsthesia an incision was made to the outer side of the original scar dividing the several layers of muscle until the peritoneum was reached. This was slowly reflected from the iliac fossa until the outer edge of the misplaced kidney could be felt and seen. As a dense mass of adhesions now seemed to bind the skin and various intraperitoneal structures to the kidney, further attempts to expose it by this route seemed unwise, as the location of the vessels entering the organ could not be determined. The peritoneal cavity was next opened by a median

incision and the free intestines packed off with large masses of handkerchief gauze. It was then found that the cæcum and several adherent loops of small intestine apparently surrounded the fistulous tract, which communicated with the upper part of the ureter. A median incision was next made in the parietal peritoneum covering the great vessels, and this was gently reflected from the median line until the kidney was finally exposed. Several large vessels were seen passing from the aorta and right iliac vessels to a cleft on the anterior surface of the kidney. These were secured and divided. After this, with one hand in the external wound and the other in the median incision, the kidney was with great difficulty separated from the overlying adherent intestines and removed. The parietal peritoneum was then replaced and sutured, both wounds were united by layer suture, and the fistulous tract packed with formalin gauze.

His convalescence was prompt and uneventful.

INJURY.

CASE III.—My case of traumatic rupture of the ureter occurred in a young man who had been crushed in a railway accident, resulting in fracture of the pelvis. When first brought to the hospital, he was catheterized and clear urine withdrawn. Later expressing a desire to urinate, he passed a small amount of dark red fluid which contained numerous blood-cells. Just before operation he was again catheterized, and clear urine again withdrawn.

On operation there was found a bilateral fracture of the pelvic brim, with laceration of the internal iliac vessels and a complete rupture of the ureter on the right side. As the patient was moribund, an attempt was made only to arrest the hemorrhage by gauze packing. He died shortly after leaving the table.

The case is of interest only in illustrating the cause of his intermittent hæmaturia.

FISTULÆ.

CASE IV.—Abdominal hysterectomy by a colleague. Accidental division of the right ureter. An attempt subsequently made by the same surgeon to implant proximal portion into bladder. As this was unsuccessful, a second operation succeeded in implanting it into upper portion of vagina. Abdominal sinus

healed but patient suffered greatly from irritation of vulva and thighs, from constant contact with urine.

After consultation it was decided to advise nephrectomy, which was successful with complete restoration to health.

CASE V.—Hysterectomy by the writer for carcinoma which surrounded right lower ureter. Ureter implanted into vault of vagina.

Recovery from hysterectomy, followed by ascending infection of right kidney. Chills, fever, delirium, and great prostration. Complete recovery after nephrectomy. Patient died the following year from recurrence.

CASE VI.—The ureteral fistula following operation for acute appendicitis in iliac kidney reported above under Congenital Malformations (Case II).

CASE VII.—Operation by colleague for pelvic infection on right side. This was followed by an abundant flow of urine from iliac wound, which had been drained. Patient in rather poor condition from prolonged sepsis. Advised no operation, but measures to insure free drainage. Sinus finally closed by granulation, the patient making a complete recovery.

STRICTURE.

CASE VIII.—Female, aged twenty-five years. For two years has experienced attacks of severe right-sided pain, with swelling in the flank, often accompanied by nausea and vomiting. No fever, no hæmaturia, no frequency in urination. X-rays negative. At operation, kidney pelvis was found moderately distended, with the ureter implanted at its upper extremity and acutely kinked. A large diamond shaped section of the posterior wall of the pelvis was removed and the wound closed with a fine catgut continuous suture, reinforced by a layer of the fibrous capsule of the kidney, which was stripped from the organ and sutured over the wound in the pelvis. She made a rapid and satisfactory convalescence. No leakage. Primary union of the wound. Patient well one year later.

CASE IX.—An unmarried female, aged twenty-nine years. Suffered for twelve years from recurrent attacks of severe left-sided renal colic, with swelling of the flank. Duration of the attacks from a few hours to four or five days. Patient greatly emaciated by prolonged suffering. Renal tumor distinctly felt,

which was as large as an egg-plant and exquisitely tender. No fever, moderate hæmaturia on one or two occasions.

On operation, kidney found displaced downward. Renal pelvis greatly distended. Dense vascular band extending from lower pole of the kidney to aorta (and aberrant renal artery). This band caused a constriction of the dilated pelvis, forming an hour-glass tumor with distortion of the ureteral implantation and obstruction of the tube. The band was divided between two ligatures, and the fluid contents of the pelvis evacuated by moderate compression. The kidney was pushed up into its normal position, which served to straighten the ureter, and the organ firmly anchored in place. The wound healed kindly, but the patient was never free from pain, and several weeks later had a severe attack, with the development of a large renal tumor. Nephrectomy was followed by complete relief. Examination of the specimen showed great thickening of the ureter at the point of previous pressure.

CASE X.—A man, thirty-four years of age, suffered for several months from right-sided attacks of typical renal colic. When examined during an attack there was tenderness and an abnormal fulness in the right flank. X-ray negative. Cystoscopy and ureteral catheterization revealed no calculus.

On exploring the kidney by a lumbar incision a dense vascular band (aberrant artery) was found passing from the lower pole of kidney, compressing the ureter. This was divided between two ligatures and the compressed ureter freed. The kidney was fixed in its normal position, and the wound closed. The convalescence was somewhat delayed by severe pain and moderate fever occurring several days after operation, probably due to a mild attack of septic infarcts. This subsided promptly, and the patient left the hospital well one month from the date of the operation. Six months later patient free from recurrence.

CASE XI.—Female, aged twenty-six years. Pain in right inguinal region for several months. Appendix removed without relief. Pain paroxysmal, radiating from kidney to groin. Microscopic blood in urine. Cystoscoped. Ureteral orifices normal. Right ureteral catheter meets obstruction near kidney pelvis. X-rays show faint shadow just above posterior spine. Ureter explored by longitudinal incision in flank. Marked angulation caused by inflammatory band. This was removed, the ureter

opened, and bougie passed upward to kidney and downward to bladder. No further obstruction encountered. Wounds closed. Primary healing. Patient reported well five years later.

CASE XII.—Male, aged forty years. History of operation for vesical calculus twenty years ago. For past four years has suffered from left-sided colic, which has become more frequent during past three months. Pain very severe, radiating to groin. Cystoscoped, urine from left kidney blood stained, and from right clear. X-rays showed round shadow near transverse process of fourth lumbar vertebra, which corresponded to point of greatest tenderness to pressure. Ureter and kidney explored, no stone found; only inflammatory thickening around pelvis of kidney, and upper part of ureter. Ureter freed from surrounding adhesions. Wound closed with fine chromic sutures. Lumbar incision united by layer suture. Recovery.

CASE XIII.—Male, forty-two years of age. Several attacks of left-sided colic with soreness and general discomfort in the flank and inguinal region most of the time. Has felt feverish at times. No blood or pus in the urine.

X-ray gave indefinite shadow over region of lower ureter near bladder. Cystoscopy revealed patent right ureter with abundant flow of urine. Left orifice pouting. No efflux after indigo carmine for one hour. Catheter could not be introduced.

An incision eight inches in length was made parallel to Poupart's ligament from a point two inches above the anterior superior spinous process. The muscles were divided until the retroperitoneal tissue was reached. The peritoneum was retracted toward the median line and a thickened and dilated ureter exposed, which was followed downward over the brim of the pelvis. When near the bladder dense adhesions were encountered, surrounding the lower inch of the canal and constricting it to a thin, dense, fibrous cord. With extreme difficulty these adhesions were separated from the impervious extremity of the ureter until its junction with the bladder was recognized. As the hemorrhage was troublesome, the wound was many times irrigated with hot salt solution and packed with gauze.

During manipulations undertaken to palpate the vesical wall, with the hope of finding a stone in the intramural portion of the ureter, the small fibrous extremity was torn from the bladder. A drop of pus slowly oozed from the minute opening in the

proximal portion of the tube, which was quickly clamped. As there was no efflux from the bladder stump, the ureter was brought outside of the wound, the small fibrous extremity cut off, and a large amount of foul-smelling pus evacuated. The bladder was next emptied, and a sound introduced and pressed firmly against the left posterior wall. A small incision was made into the viscus at this point, and the free extremity of the ureter drawn into the bladder and sutured by the Van Hook method. The wound was then very carefully disinfected and closed by layer suture; a large cigarette drain remaining in the lower angle, which extended to the retroperitoneal space in the bottom of the pelvis. No reaction followed the operation. The entire wound healed primarily without leakage of urine.

CALCULUS CASES.

CASE XIV.—Boy of fourteen years entered Roosevelt Hospital suffering from pain over the appendix region and marked tenderness at McBurney's point. Indefinite history of fever with previous attacks.

Diagnosis of chronic appendicitis. Normal appendix removed. Re-entered hospital several months later with large hydronephrosis. Kidney removed. Ureteral sound passed into ureter and arrested near bladder. Several months later patient again entered hospital with impacted oblong calculus in posterior urethra. This was removed by perineal section, with complete and permanent relief.

CASE XV.—Young negro entered Roosevelt Hospital suffering agonizing pain near McBurney's point. No fever, no muscular rigidity except during height of attack. History of many similar attacks during past six months. Right kidney had been explored in another hospital.

On the advice of one of the older surgeons, I removed a normal appendix with complete relief of symptoms for several weeks. The attacks, however, returned, and after a number of examinations I detected a few red blood-cells in a specimen of urine passed immediately after a particularly severe attack. No X-ray or cystoscopy available at that period.

Believing that we had to do with a calculus somewhere in the right urinary tract, the right kidney and upper third of the ureter were exposed by a long lumbar incision. The kidney appeared normal, but a small calculus was detected lodged in

the upper part of the ureter just below the pelvis. The ureter was opened by a longitudinal cut, the stone removed, and the ureteral incision closed by three or four fine chromic catgut sutures. He made an uninterrupted recovery.

CASE XVI.—Male, aged thirty-four years. Suffered from right-sided renal colic for twenty-six years. Hæmaturia and pyuria present. Right kidney explored for stone, with negative result, six months before admission. X-ray examination showed dark shadow near spine of ischium. Ureteral orifice everted, catheter arrested in lower ureter. Operation, eight inch incision parallel to Poupart's ligament; external oblique aponeurosis split; internal oblique and transversalis muscles divided transversely. Peritoneum separated from iliac fascia and right side of pelvis. Stone felt near ischial spine. Ureter much thickened and dilated above calculus, which was pushed upward to brim of pelvis. Longitudinal incision in ureter, irregular mulberry stone removed. Ureteral wound closed by five chromic catgut sutures, muscles united by plain gut. Cigarette drain to retroperitoneal space. Skin united with silkworm gut. Primary union. No leakage of urine.

CASE XVII.—Male, aged forty-nine years. Suffered from right-sided colic and frequent micturition for two or three years. X-ray showed oblong shadow near vesical end of right ureter. Cystoscopic examination showed eversion and cedema of right ureteral orifice. Ureter exposed by same incision as in previous case. Calculus felt at junction of bladder. Ureter opened near pelvic brim for exploration with metal probe. Attempt to push calculus upward to ureteral wound unsuccessful. Second opening over stone, which was easily removed. Both ureteral openings sutured with fine chromic catgut, the lowermost with considerable difficulty. Wound closed. Primary healing.

CASE XVIII.—Female, aged forty-three years. Suffered from attacks of left-sided pain for sixteen years. Has had left ovary and tube removed, kidney and ureter explored, and ventral hernia operated upon without relief. Blood and pus in urine. X-ray examination showed small distinct shadow at vesical end of ureter. Bladder opened above pubis. Probe introduced into left ureter. Stone felt one-half inch above meatus. Ureteral orifice enlarged and stone removed by forceps. Suprapubic wound closed. Frequent catheterization. Primary union and complete recovery.

CASE XIX.—Female, aged forty years. Left-sided colic for eighteen years, becoming more frequent and severe for last eighteen months. Slight hæmaturia and frequency. Cystoscopic examination. Ureteral orifice puffy. Ureteral catheter meets slight obstruction at seven inches, which is, however, easily overcome, and passed to pelvis of kidney. X-rays show distinct shadow near pelvic brim. Ureter explored in usual manner. Stone felt just below brim, easily pushed upward to dilated portion of ureter, and removed through longitudinal incision. Wounds closed in usual manner. Complete healing under first dressing.

CASE XX.—Male, forty years of age. Several attacks of severe left-sided colic radiating from kidney to groin and testicle. Duration three weeks. No frequency, no fever, slight hæmaturia. X-ray shows angulated shadow over upper third of left ureter. Ureteral catheter obstructed at this point. Ureter exposed in loin by lumbar incision, longitudinal opening through which calculus was removed. Ureteral wound sutured with fine chromic catgut. Abdominal wound closed in usual manner. Primary healing.

CASE XXI.—The patient whose history was presented as Case I under Congenital Malformations.

CASE XXII.—Male, fifty-five years of age. Exceedingly obese, suffered from severe left-sided abdominal pain, with nausea, vomiting, and great prostration. Bowels constipated, and no effort on the part of the attending physicians to produce a movement had been successful. The abdomen became distended, and his condition became critical. I saw him in consultation in the country, where cystoscopy and radiography were out of the question. The diagnosis rested between renal colic and intestinal obstruction. The size of the patient and his extreme tenderness and restlessness prevented our obtaining any reliable data from the physical examination.

Under ether anæsthesia, the abdomen was explored with negative result, but a large renal tumor was appreciated by the examining hand within the peritoneal cavity. The abdominal wound was closed and an enormous hydronephritic kidney exposed by a lumbar incision. This was opened and drained through the cortex, with complete relief of symptoms. The sinus persisted for several weeks, with more or less pain at intervals over the lower ureter. Finally after a particularly severe

pain, the discomfort entirely disappeared and a small calculus was passed the next day. After this the urinary fistula quickly closed, and the man regained his usual health.

CASE XXIII.—Female, twenty-two years of age. For two years patient has had attacks of severe right-sided pain shooting along the course of the ureter to the pelvis. Occasional vomiting. Thinks she has noticed red urine. Occasional attacks milder in character and accompanied by moderate fever. Physical examination practically negative. X-rays show small definite shadow near right kidney. Cystoscopy: both ureteral orifices moderately oedematous. Both ureters catheterized. Only small amount of purulent urine from right, abundant flow from left. Indigo carmine appeared in twelve minutes.

Kidney and upper ureter exposed by lumbar incision. Small, round, and irregular calculus in upper ureter. This was removed through the usual longitudinal ureteral incision, which was subsequently closed with fine chromic catgut sutures. Primary union. Complete recovery.

CASE XXIV.—Male, aged thirty-five years. Severe attacks of right-sided renal colic for several months. Intermittent attacks of fever and frequent micturition. Record fails to give urinary analysis or result of physical examination. X-rays show small shadow near bladder. Cystoscopy: left ureteral orifice normal; right, typical "golf hole" appearance. Abundant flow of normal urine from left catheter. Right ureter could not be catheterized, but small stream of thick pus was seen to exude from meatus.

Lower ureter exposed by long iliac incision, followed down to point near its junction with bladder. At this point the calculus was encountered and removed by a longitudinal incision. Ureteral wound united with fine chromic catgut sutures. Muscles and skin separately sutured. Cigarette drain to retroperitoneal space. Primary healing.

CASE XXV.—Male, sixty years of age. Fifteen years ago noticed soreness in left groin, which increased in severity, became stabbing in character, and radiated to left testicle. These attacks continued until three years ago, when he passed several small fragments of stone. Temporary relief followed but was succeeded by more pain; tenderness over kidney and ureter, frequency of micturition, rectal tenesmus, and the passage of mucus with the stool. X-rays show small shadow near ureteral implantation into bladder. Cystoscopy: abundant flow of normal urine

from right ureteral orifice, only small amount of pus from left. Right ureteral orifice normal; left pouting; intravesical portion of ureter swollen and projecting into bladder. Catheter easily passed to right kidney, but could not be introduced into left.

Under ether anæsthesia left lower ureter exposed by long inguinal incision. Ureter found dilated with retained urine. Ureter followed to bladder. Considerable induration at point of implantation, but no stone could be detected. Incision extended transversely across bladder region just above pubis. Bladder opened and stone easily palpated in intramural portion of the bladder. Incision made through bladder mucosa into ureter, and stone removed. Bladder wall united; abdominal incision sutured in usual manner, perineal drainage of bladder. Primary union. No leakage from bladder. Patient has since passed small fragments of stone with only slight discomfort.

CASE XXVI.—Female, fifty-five years of age. History of several attacks of right-sided renal colic, followed by a severe attack, with fever, chills, and some sweating. When first seen by the writer there was easily palpated a large, tender, kidney-shaped mass in the right flank. As the patient was passing the summer in the country, no cystoscopy or X-ray examination was made. The patient was immediately prepared for operation.

On exposing the kidney by a long lumbar incision, its pelvis was seen to be distended with pus, the parenchyma highly congested and œdematous. A large opening was made through the cortex, and about 500 c.c. of thick, foul-smelling pus evacuated. About four inches below the kidney the ureter was found to be completely occluded by a large oval calculus. This was removed by a longitudinal incision in the walls of the ureter, which was then probed and found to be patent. No effort was made to suture the ureteral wound on account of the acute infection. The parietal wound was partly closed with adequate drainage, and the patient made a slow but complete recovery.

In addition to the thirteen cases in which stone was found and removed from the ureter, the writer has observed a large number of others in which stones in the ureter, suspected by the symptoms, were demonstrated by the X-rays, cystoscopy, or ureteral catheterization, and were subsequently passed. I will refer to but three of these.

CASE XXVII.—A man of forty-eight years, who had a small stone arrested in the lower part of the left ureter. There was a history of three or four attacks of severe left-sided colic during the preceding eighteen months. When he entered the hospital there was moderate paroxysmal pain, tenderness one inch above the external inguinal ring, and some frequency of urination. Urine contained a moderate amount of blood. X-ray examination showed small oblong stone in lower segment of left ureter. I advised against operation for the reason that at that time I had had no experience in operations on the lower ureter, and regard the procedure as more dangerous than expectant treatment. He drank copiously of Poland water and expelled his stone at the end of four or five days.

CASE XXVIII.—A man, thirty years of age, entered the hospital suffering from severe right-sided renal colic. Cystoscopic examination revealed a stone arrested in the right ureteral orifice. While being prepared for operation the stone was expelled, with complete disappearance of symptoms.

CASE XXIX.—The history of this case, occurring as it did in a member of our house staff, is reported somewhat in detail, because it furnishes an absolutely accurate statement of the sensations experienced by an individual suffering from an arrested calculus in the lower ureter, together with the signs observed and immediately recorded by a colleague who was in constant attendance.

Previous to initial symptoms there had been no indication whatever of renal or vesical trouble. However, in the three or four months preceding attack there had been occasional twinges of pain in right lower quadrant. They were not severe, occupied but the fraction of a second, and were not considered seriously.

On February 3, about 11.30 A.M., patient experienced pain on right side of glans which lasted about one-half hour. It was definitely localized just behind corona, and might be well described as a sensation produced by the moderate pressure of a pencil point against the mucous membrane. So localized was this pain that the patient referred it to some slight traumatism, but on examination found nothing to account for it. About one hour later (at least one and a half hours after this pain disappeared), several drops of bright red blood were noticed at the end of micturition. Following this there was moderate vesical tenesmus

and about half-hour frequency, both largely due to alarm and the desire to see if there would be further hemorrhage.

About one-half hour after the first appearance of blood patient voided six ounces of claret-colored urine and, within the next hour, twelve ounces of urine similarly colored. The bladder was then irrigated and the return was slightly blood tinged. A sound was also passed in the effort to locate a vesical calculus. Within fifteen minutes after this instrument, pain of a colicky character began. Its seat was in the lower pelvis, and there was but very short radiation up the right side. The right testicle became slightly tender and there was moderate irritation at the meatus. These symptoms became rapidly more severe and there was definite radiation upward and downward along the distribution of the genitocrural nerve. The testicle became much more tender, and irritation at the meatus marked. There was pronounced rigidity, mainly on the right side, and vomiting. These symptoms, somewhat relieved by opiates, continued until the following morning. The urine continued bloody until about 4 P.M., sixteen hours after blood was first seen.

During the next day the pain persisted, but had lost its acute character and involved the whole lower right quadrant. Testicle still sore, but irritation at meatus completely disappeared. On the second night the pain again became acute and continued so until the morning, when it practically ceased, leaving only a feeling of soreness on the affected side. Patient felt perfectly well, was out over two hours, and had two sets of X-ray plates taken.

The following (third) night pain began again. It was very acute, radiated downward as before, but higher than previously, the right lumbar region was exceedingly tender. There was moderate soreness in the right testicle and slight irritation at the meatus. Large quantities of water were taken and there was frequency, with perfectly clear urine. This acute attack persisted until noon of the following day, when great relief was obtained by frequent change of position and the sitting posture. Patient retired about 11 P.M. with practically no pain, and slept soundly until 3 A.M., when he was awakened by exceedingly acute pain extending from high in the right lumbar region to the testicle and marked irritation at the meatus. Clear urine was immediately passed. This attack lasted about one hour, when the pain suddenly disappeared. About six ounces of urine was then voided, which was of a dirty brown color and contained

numerous small clots, but no fresh blood. Patient slept comfortably and had no more pain until 11 o'clock the following day, when another attack began. The pain was now localized in the lower pelvis and there was no radiation. Soreness of the right testicle and irritation of the meatus were slight. Then the most severe pain yet experienced occurred and lasted about two hours, when there suddenly came a very acute paroxysm followed by a sensation as if a constriction had been released or as if something had given way. There was immediate cessation of all pain, and in a few minutes a small calculus was passed with about ten ounces of urine, dirty brown in color and containing small clots. No fresh blood was present. A slight soreness in the pelvis only remained for two days.

In all of these cases the stone was small, not over .5 centimetre in diameter. Yet in all three, the colic was as severe as any I have ever observed.

I now desire to record four mistakes in diagnosis, in which the ureter was exposed by the lumbar or iliac incision, opened and explored, but no stone found.

CASE XXX.—A man, twenty-eight years of age, suffered from intense left-sided renal colic at intervals for several weeks, with hæmaturia, frequent micturition, and tenderness in the left inguinal region. X-ray negative, except for a faint shadow near kidney. Cystoscopy showed left ureteral orifice everted and œdematous, with a long, worm-like blood-clot emerging. Catheter could not be introduced more than a few centimetres. The kidney and lumbar portion of the ureter were exposed, the kidney palpated, the ureter opened and explored with a metal probe. Slight resistance was encountered near its vesical extremity, but this was easily overcome, and a full sized instrument passed to bladder. Primary union of both wounds.

CASE XXXI.—Male, aged thirty-six years. Severe pain in left flank; vomiting, with tenderness over kidney. Hæmaturia. X-ray shadow faint and without well-defined edges near ischial spine. Cystoscoped. Left ureteral orifice everted, blood emerging; could not be catheterized. Ureter explored by abdominal incision, opened, and found to be patent. Bougie seen in bladder by cystoscope. Wounds closed in usual manner.

CASE XXXII.—Male, aged forty-eight years. Mild pain

over lower left ureter on walking. No urinary symptoms, no vomiting, no pain, no tenderness over kidney. Tenderness in left inguinal region. Distinct shadow on X-ray plate in left half of pelvis. Ureter explored by usual incision; hard mass felt in contact with ureter. Ureter opened, probe passed easily to bladder and to pelvis of kidney. Peritoneal cavity opened. Calcified appendix epiploica of sigmoid adherent to parietal peritoneum over ureter. This was removed. Wounds closed. Primary healing.

CASE XXXIII.—Male, aged forty-five years. Admitted for operation for chronic appendicitis. X-rays showed small round shadow near transverse process of fourth lumbar vertebra on right side. Abdominal incision over appendix to retroperitoneal space. Ureter exposed, opened, and sounded, with negative result. Peritoneal cavity next opened and diseased appendix removed. All wounds closed in usual manner. Primary union.

In reviewing the above case histories, it will be seen that the majority of my mistakes in diagnosis were made in cases supposed to be calculus. There were six of these. In three, other lesions were found which were sufficient to account for the symptoms. In the remaining three no lesions were found to account for the symptoms, although an extra-ureteral calcareous body was found in one instance, which gave rise to the shadow in the X-ray plate, and in another there was reason to believe that a stone was present at the time of the examination, which passed before the ureter was opened. Of my three other mistakes in diagnosis, two were in mistaking a ureteral calculus for a lesion of the vermiform appendix, and one in mistaking a ureteral calculus for intestinal obstruction. In none of these cases did I have the aid of cystoscopy or radiography. Only one death occurred in the series, and that was the traumatic case which was moribund at the time of his admission, and in which nothing was done other than to check the hemorrhage by gauze packing.

Of the fifteen cases in which the ureter was exposed, opened, and subsequently sutured, all healed without infection and without leakage of urine. The same may be stated in regard to the two cases in which a ureteral calculus was removed through an opening in the bladder.

TRANSACTIONS

OF THE

NEW YORK SURGICAL SOCIETY.

Stated Meeting, held March 8, 1911.

The President, DR. ELLSWORTH ELIOT, JR., in the Chair.

TUMOR OF THE TONGUE OF UNCERTAIN CHARACTER.

DR. EDWARD M. FOOTE presented a man, 45 years old, who in January, 1901, had a rectal abscess which was incised and drained, and which healed slowly, necessitating three additional operations during the following three years. The condition finally healed about four years ago. About that time, the patient's mouth became tender, with swelling of the lips, cheeks, and gums. In December, 1909, portions of the lips and cheeks were cut away, and in July, 1910, the tongue was cauterized twice by Dr. Mayo, of Rochester. Although the patient never had any symptoms of syphilis, he had been given antisypilitic treatment at different times in West Baden Springs, Ind., Hot Springs, Ark., and recently in New York City, without any curative effect. On December 9, 1910, a Wassermann test was negative, and no spirochætæ were found in the blood.

On November 9, 1910, a wedge-shaped piece was removed from the dorsum of the tongue, and another from its left margin. In spite of this, the tongue continued to increase in size, and on January 26, 1911, Dr. Foote amputated about one inch of it. The wound was sutured, and healed primarily. Sections of the tongue were submitted to microscopic examination to four pathologists, with the following result: Dr. James Ewing regarded the condition as a macroglossia from chronic myositis, with secondary plasma-cell infiltration of the tissues. Dr. John A. Fordyce said the condition might be a sarcoma, but he did not feel inclined to commit himself definitely to that diagnosis. Dr. D. Stuart Dodge Jessup thought it was possible to rule out carcinoma, sarcoma, and syphilis, and in the presence of giant-cells, tubercle tissue and bacilli, there was slight ground for the diagnosis of tuberculosis. The cells of the growth had the ap-

pearance of plasma cells, and for lack of a better name, the term plasmoma might be employed. Dr. F. M. Jeffries pronounced it a small, round-celled sarcoma. Dr. William B. Coley, who also examined the patient, said that from a clinical stand-point he thought syphilis and malignancy could be ruled out, and he considered the condition probably macroglossia of the chronic inflammatory type.

Since February 3, 1911, the patient had received fourteen injections of the mixed toxins (from 1 to 10 minims each) with moderate systemic reaction and slight checking of the growth of the tongue.

TRANSPLANTATION OF MALDESCENDED TESTIS, PERINEAL,
INTO THE SCROTUM; RESULT FOUR YEARS
AFTER OPERATION.

DR. WILLIAM B. COLEY showed a man, 29 years old, who was operated upon in April, 1907, for an inguinoperineal hernia, with the testis in the middle of the perineum. The testicle was transplanted into the scrotum, but a few months later it retracted into its original position in the perineum. In October, 1907, Dr. Coley again operated, this time suturing the testicle to the bottom of the scrotum. It had remained in perfect position ever since, and there had been no recurrence of the accompanying hernia.

The testicle was of absolutely normal size, and occupied a position in the scrotum quite as low as the other. In his paper on "The Treatment of the Undescended or Maldescended Testis," *ANNALS OF SURGERY*, September, 1908, he reported the result of operation in nine cases, and stated that he had observed six other cases of perineal ectopia which were not operated upon.

INOPERABLE SARCOMA OF THE SCAPULA IN AN INFANT
TWO MONTHS OLD SUCCESSFULLY TREATED WITH THE
MIXED TOXINS OF ERYSIPELAS AND BACILLUS PRO-
DIGIOSUS.

DR. WILLIAM B. COLEY presented a child who, when an infant two months old, was referred to him on June 20, 1910, by Dr. John F. Harrison of Stamford, Conn., as a case of inoperable, malignant tumor of the scapula. The family history was unimportant, with the exception that the mother had a hard tumor removed from the first joint of the big toe a year and a half ago; this, apparently, was not submitted to microscopical ex-

amination. At the birth of the child, labor was difficult, and Dr. Harrison stated that the left shoulder was strained. No swelling, however, appeared until two weeks after birth, when a small tumor was noticed in the midscapular region, apparently starting in the bone or periosteum. This grew rapidly, and examination on June 20, 1910, showed a tumor occupying almost the entire region of the left scapula, 3 by 3 inches in diameter, and projecting about three-quarters of an inch beyond the level of the surrounding parts. The tumor was firmly fixed to the scapula, and had about the consistence of an osteosarcoma. The skin over it was of a purplish hue, and was covered with dilated veins; no fluctuation was present, and there was no evidence of inflammatory trouble. The clinical diagnosis was so certain and the prognosis seemed so hopeless that a microscopic examination was not made. Dr. Coley's diagnosis was confirmed by Dr. Virgil P. Gibney, and treatment with the mixed toxins was immediately begun, the initial dose being one-tenth of a minim, which was gradually increased to one-half minim, which latter dose produced a temperature of 102° F.

At the end of two weeks' treatment there was unmistakable improvement, as shown by slight decrease in the size of the tumor and diminished vascularity. At the end of six weeks, the dose of the toxins could be increased to two minims. After three weeks' treatment, the patient was sent home, and the toxins had been continued up to the present time by the family physician, Dr. Harrison, at first three times a week, later twice a week, and during the past two or three months only once a week. The improvement evident at the end of the first two weeks of treatment had steadily continued, and in October the growth had decreased to one-fourth its original size, and two months later it had practically entirely disappeared.

The child was in perfect health at present, and no trace of the original growth could be detected. Movements of the arm were normal.

THE DE LORME-SCHEDÉ OPERATION FOR EMPYEMA: TWO CASES.

DR. OTTO G. T. KILIANI presented these cases in order to show the final results of the operation. In the first case, that of a girl 21 years old, the operation was done twelve years ago,

the patient having been operated on for empyema 21 months prior to that time, with a resulting fistula and discharge. Dr. Kiliani removed the fourth, fifth, sixth, seventh, and eighth ribs on the right side, and in spite of the fact that the lung on this side had been completely occluded for 21 months, it began to expand immediately when the pseudomembrane covering it was stripped off. At the time of the operation, the child was about nine years old. The operation resulted in complete healing of the old fistula, which had never reopened. With the exception of a marked scoliosis, the girl was now practically well.

Dr. Kiliani's second patient was a man, who had pneumonia in 1904 and who was operated on seven weeks later for empyema. Following this, a fistula developed which persisted for four years, and in December, 1908, he had a cavity with a capacity of 40 c.c. At that time three ribs were resected, and three months later the cavity had a capacity of eight ounces.

On March 27, 1909, Dr. Kiliani made a typical horseshoe incision, reopening the old scar, and resecting the fourth to the ninth ribs inclusive. The pleura was enormously thickened, and after stripping off the pseudomembrane, the lung expanded at once, in spite of the compression to which it had been subjected for four years.

This patient had remained free from any signs of a recurrence until a few days ago, when a slight fistula developed at the lower angle of the wound.

TUBERCULOSIS OF THE SKULL.

DR. KILIANI presented a young man, who, fourteen years ago, had two huge abscesses of the skull, which were operated on in Germany and which were supposed to be gummata. A year ago, at St. Luke's Hospital in New York, he was operated on for a bony abscess of the skull, and following this there was a fistulous opening which refused to heal.

Recently Dr. Kiliani trephined the skull over the site of the fistulous tract. The bone was much thickened, and tubercular granulations were found between the skull and the dura. The diagnosis in this case, the speaker said, rested between lues and tuberculosis. A Wassermann test had been made, with negative results. A microscopic examination of the soft parts did not show with certainty any evidences of tuberculosis.

LUNG ADHERENT TO SUBCUTANEOUS TISSUES.

DR. ROBERT T. MORRIS presented a woman upon whom he had recently operated for a sarcoma involving the seventh, eighth and ninth ribs. In this case, the intratracheal insufflation method of anæsthesia would have been desirable, but not having the apparatus at hand, Dr. Morris said he resorted to a method which he had used in certain cases of injury of the lung, namely, he simply allowed the lung to collapse while he was doing the resection of the ribs. When this was completed, and after sponging out the blood-clots and nearly closing the wound by suture, he pumped the air out of the pleural cavity and the lung then expanded.

The gap in the chest wall was now covered with only skin and the subcutaneous tissues; the lung had become adherent to the latter, and as the patient breathed, the skin moved back and forth with each respiration. No drainage was employed. There was very little cough. The patient had practically full lung function on that side.

DISLOCATION OF THE CARPAL SEMILUNAR.

DR. MORRIS presented a man who fell from a step-ladder, dislocating his left carpal semilunar bone in such a manner as to cause intense suffering for several days. A radiograph was taken, which showed the dislocated bone crowded down in front of the os magnum and unciform. Under anæsthesia, the bone could be replaced with slight pressure, but when this was released, it again immediately slipped out of place. It was again forced into its proper position, and kept there by a section of rubber tubing placed on each side of the carpus and held in place by bandages. When these were removed, after three weeks, it was found that the bone had again become displaced, but only to a slight extent. The patient had remained entirely free from pain, and the simple procedure in this case, Dr. Morris thought, had obviated the necessity of removing the bone. It might become necessary, at some time in the future, to break up the adhesions.

MYELOMA OF TENDON SHEATH.

DR. FRANK S. MATHEWS presented this case. The patient was a woman who had had a tumor of the distal phalanx of the first finger. It was very hard, and about the size of a hazel-

nut. A transverse incision was made across the palmar aspect of the finger, and through this the tumor could be readily shelled out. It had no connection with the skin or bone, but sprang from the flexor tendon sheath. Pathologically, it was giant-celled sarcoma, and illustrated the fact that these giant-celled tumors, of whatever origin, were practically always to be classed as non-malignant.

In connection with this case, Dr. Mathews said that about a year ago, while preparing his paper on "Myeloma of the Long Bones" (*ANNALS OF SURGERY*, Sept., 1910), he first learned of these tumors originating in the tendon sheaths. He looked up the subject, and found that Sutton, Adami, and others made no mention of tendon sheath giant-celled tumors, and in most of the pathological works they were referred to only as originating in the bones. At the meeting of this Society on November 9, 1910, Dr. William Darrach read a paper on "Tumors of the Hands and Fingers" in which he referred at some length to these tumors of tendon sheath origin, which he said had been described by certain French writers under the name of "myeloma" though realizing that they have no relation to bone marrow.

INTRAMEDULLARY GLIOSARCOMA OF THE CERVICAL CORD
(FIFTH, SIXTH, AND SEVENTH SEGMENTS); LAMINECTOMY AND REMOVAL OF THE TUMOR IN TWO STAGES;
RECOVERY.

DR. CHARLES A. ELSBERG presented a woman, 42 years old, who was referred to the surgical department of the Neurological Institute from the service of Dr. Joseph Fraenkel on January 12, 1909, with the following history: After a sore throat in the spring of 1907, she began to suffer with pain of a boring character in the back of the neck. The pain gradually extended to the shoulders and down the arms, and was followed by numbness in the right hand. For about two years these symptoms occurred in attacks, between the attacks the patient feeling well. In the summer of 1909 she first began to notice some awkwardness in the left arm, soon followed by considerable loss of power in that extremity, and later in the left leg. About this time, the pain in the upper extremities grew less marked. By the fall of 1909 the awkwardness had affected also the right upper and lower extremities, and the patient's

loss of power was so great that she had much difficulty in walking. Then followed a very rapid loss of power in the upper extremities, especially the left, and a recurrence of the pain in the back of the neck and shoulders. Soon the lower limbs became very weak and stiff.

The patient's general condition was good. She was well nourished; the special senses were normal; there was no difficulty in swallowing nor in urination or defecation. The pupils were of normal size and reacted well to light and accommodation. She had to be supported when she sat up in bed, and could walk only with the greatest difficulty when supported. The vertebral column, in the cervical and dorsal region, was held rigid, and there was marked tenderness on percussion over the spines of the fourth, fifth, and sixth cervical vertebræ. When the attempt was made to flex the neck on the chest, the patient had a feeling of constriction around the upper part of the chest.

The motor power in both upper extremities was much diminished, more so on the left than on the right side. When the patient attempted to move either extremity, there was very coarse ataxia, and she stated that she did not know the position of the limbs unless she looked at them. The left arm could barely be raised away from the body; all movements at the elbow were weak, and extension of the forearm was impossible. All of the muscles of the left arm and forearm reacted only slightly to the faradic current, and no contraction of the triceps could be obtained. There was marked atrophy of the muscles forming the thenar and hypothenar eminences on the left side, and of the triceps and infraspinatus. On the right side, similar changes to those on the left were present, but they were much less marked.

The motor power in the lower extremities was much diminished, especially on the left side. The knee-jerks were exaggerated, especially the left; there was double ankle clonus, Babinski, Oppenheim, all more marked on the left side. An X-ray examination failed to show any changes in the vertebral column. Fluid obtained by lumbar puncture was not under great pressure, and did not contain anything abnormal.

The patient was transferred to the surgical department by Dr. Fraenkel, with the diagnosis of tumor of the cord between the fourth and seventh cervical segments. A cervical pachy-

nut. A transverse incision was made across the palmar aspect of the finger, and through this the tumor could be readily shelled out. It had no connection with the skin or bone, but sprang from the flexor tendon sheath. Pathologically, it was giant-celled sarcoma, and illustrated the fact that these giant-celled tumors, of whatever origin, were practically always to be classed as non-malignant.

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(FIFTH, SIXTH, AND SEVENTH SEGMENTS); LAMINECTOMY AND REMOVAL OF THE TUMOR IN TWO STAGES;
RECOVERY.

DR. CHARLES A. ELSBERG presented a woman, 42 years old, who was referred to the surgical department of the Neurological Institute from the service of Dr. Joseph Fraenkel on January 12, 1909, with the following history: After a sore throat in the spring of 1907, she began to suffer with pain of a boring character in the back of the neck. The pain gradually extended to the shoulders and down the arms, and was followed by numbness in the right hand. For about two years these symptoms occurred in attacks, between the attacks the patient feeling well. In the summer of 1909 she first began to notice some awkwardness in the left arm, soon followed by considerable loss of power in that extremity, and later in the left leg. About this time, the pain in the upper extremities grew less marked. By the fall of 1909 the awkwardness had affected also the right upper and lower extremities, and the patient's

loss of power was so great that she had much difficulty in walking. Then followed a very rapid loss of power in the upper extremities, especially the left, and a recurrence of the pain in the back of the neck and shoulders. Soon the lower limbs became very weak and stiff.

The patient's general condition was good. She was well nourished; the special senses were normal; there was no difficulty in swallowing nor in urination or defecation. The pupils were of normal size and reacted well to light and accommodation. She had to be supported when she sat up in bed, and could walk only with the greatest difficulty when supported. The vertebral column, in the cervical and dorsal region, was held rigid, and there was marked tenderness on percussion over the spines of the fourth, fifth, and sixth cervical vertebræ. When the attempt was made to flex the neck on the chest, the patient had a feeling of constriction around the upper part of the chest.

The motor power in both upper extremities was much diminished, more so on the left than on the right side. When the patient attempted to move either extremity, there was very coarse ataxia, and she stated that she did not know the position of the limbs unless she looked at them. The left arm could barely be raised away from the body; all movements at the elbow were weak, and extension of the forearm was impossible. All of the muscles of the left arm and forearm reacted only slightly to the faradic current, and no contraction of the triceps could be obtained. There was marked atrophy of the muscles forming the thenar and hypothenar eminences on the left side, and of the triceps and infraspinatus. On the right side, similar changes to those on the left were present, but they were much less marked.

The motor power in the lower extremities was much diminished, especially on the left side. The knee-jerks were exaggerated, especially the left; there was double ankle clonus, Babinski, Oppenheim, all more marked on the left side. An X-ray examination failed to show any changes in the vertebral column. Fluid obtained by lumbar puncture was not under great pressure, and did not contain anything abnormal.

The patient was transferred to the surgical department by Dr. Fraenkel, with the diagnosis of tumor of the cord between the fourth and seventh cervical segments. A cervical pachy-

meningitis hypertrophica was also deemed possible, the latter diagnosis having been considered by Dr. Fraenkel because of the fact that the symptoms had begun immediately after a severe tonsillar inflammation. All the symptoms pointed to a rapidly increasing pressure on the lower part of the cervical cord, more on the left side. The notes of the case made at that time stated that on account of the early history of pain, the lesion was probably extramedullary; that it was probably a tumor, and that its upper level from the beginning was evidently at the level of the fifth cervical segment of the cord.

On January 13, 1910, Dr. Elsberg made a median incision over the spinous processes of the fourth cervical to the first dorsal vertebræ, the exposure and removal of the spines and laminæ being done in the usual manner. The slight bleeding was controlled by packings of hot saline solution. The dura was tense, and no pulsation could be seen nor felt. An incision, 5 cm. long, was made in the dura, and was followed by the escape of a moderate amount of cerebrospinal fluid from above. The exposed portion of the cord was much enlarged.

In incising the dura, the smooth posterior surface of the prominent and enlarged cord was nicked in two spots. From the small openings, distinct tumor tissue began to extrude from the otherwise intact cord. The minute openings were then united by an incision on the posterior surface of the cord, and the intramedullary growth became more and more prominent. It was evidently advisable to further enlarge the incision in the cord and allow the natural intramedullary pressure to gradually extrude the growth. The incision in the posterior column was then enlarged until it was 1 cm. long. Under the eye there then occurred a small extrusion of a mass which was clearly tumor tissue, and which seemed to be connected with a larger mass within the substance of the cord.

The operation had thus far lasted only 40 minutes, and little blood had been lost. The patient's condition, however, was not very good; she looked pale; her pulse was 120, and only of fair quality. It was decided, therefore, to desist from further manipulations for the time being. The muscles were carefully sutured together with interrupted catgut stitches, the fascia with a continuous stitch, and the skin edges were united by a sub-

cuticular suture. Over this a voluminous dry dressing was applied. The patient was in good condition on the following day, but the second stage of the operation was delayed for one week.

On January 20, 1910, the wound, which had healed by primary union, was reopened, and the dura and cord exposed. It was then found that a large tumor mass had been extruded from the cord, and lay almost outside of and on top of the cord between the fourth cervical and first dorsal segments. With little difficulty, very slight handling of cord substance, and practically no bleeding, the tumor was peeled out of its bed. Three posterior nerve-roots on the left side, entirely separated from their origin from the cord substance, ended in a thin layer of cord tissue, which formed part of the wall of the cavity left after removal of the tumor.

After careful cleansing of the cavity, the edges of the pia were sutured together with fine catgut; the dura was then closed by a running suture of fine silk, and the muscles and skin were united by catgut sutures. Dry dressing was applied. The duration of operation was 55 minutes. The condition of the patient at the completion of the operation was good: pulse 108, and of good quality; respirations, regular and deep.

The tumor that had been removed was of a reddish-brown color; it was soft and oedematous, measuring 5.3 by 2 cm., and weighing 15 Gm. The specimen was examined by Dr. F. S. Mandlebaum, Director of the Laboratory of Mt. Sinai Hospital, who reported it to be a gliosarcoma.

The patient made a very rapid recovery from the operation. The wound healed by primary union, and all dressings were discarded after the second week.

For the first few days after the operation, the weakness of the extremities and the sensory disturbances were somewhat more marked. After this, rapid improvement followed. By the end of the fourth week the patient was able to sit up out of bed without assistance, and the muscular power in the limbs improved rapidly. The paralysis of the triceps had disappeared. The muscular power in the lower extremities returned somewhat more slowly, but there was a constant and steady improvement. Two months after the operation she was able to stand on her

feet and take a few steps when well supported, but the lower limbs, especially the left, were still very ataxic. Most of the sensory disturbances had by this time disappeared. From the first week after the operation she had had no pain.

At the present time, eight months after the operation, she could use her hands freely, could write without difficulty, and could walk about the room with practically no support. She still had some hypæsthesia in the left hand, and her left leg was still somewhat stiff. She was steadily improving, and this improvement had been much aided by careful massage and exercises.

OSTEOPLASTIC CRANIOTOMY.

DR. ELSBERG presented a woman, 33 years old, upon whom he had operated two months ago. About three years ago she began to suffer from peculiar mental symptoms, with loss of memory. A year later she began to be unsteady on her feet, and to suffer from attacks of headache, with vomiting. During the last year her sight had become progressively worse, the headache and vomiting had persisted, and her mental symptoms became much aggravated, so that she would sit or lie for days without responding to questions or helping herself in any way.

The patient was admitted to the Neurological Institute in the service of Dr. Pearce Bailey, who suspected a neoplasm in the right prefrontal region. The patient had marked choked disk, left-sided ataxia, with exaggerated tendon reflexes in the lower extremities. Dr. Elsberg performed an osteopathic craniotomy and explored the right lobe of the brain, but found nothing abnormal. There was no increase in intracranial tension. The bone flap was returned into place, and a subtemporal decompression done. Recovery from the operation was prompt, and all of the patient's symptoms excepting some difficulty in sight disappeared very rapidly. At the present time the patient was in all respects normal, with the exception of some postneuritic atrophy.

Dr. Elsberg also showed photographs of two cases of brain tumor removed from the posterior fossa of the skull. These patients were now well, the one two years and the other one year after the operation.

CALCIFIED DEPOSIT IN A MESENTERIC GLAND.

DR. JOHN F. ERDMANN showed an X-ray photograph of this condition. The case was that of a man 45 years old, who was supposed to be suffering from gall-stones and a calculus in the right kidney. A series of X-ray pictures was taken, which showed a shadow just to the left of the lumbar spine varying in its site. This was thought to be possibly due to an impaction of bismuth. Upon operation for his cholecystitis the region of the shadow was explored and proved to be a large calcified mesenteric gland, which upon removal was the size of a large chestnut and entirely calcific.

SUBSTERNAL CYSTS OF THE THYROID.

DR. WALTON MARTIN read a paper on this subject, for which see page 737.

In connection with his paper, Dr. Martin showed an illustrative case.

DR. HOWARD D. COLLINS said that in the only case of this kind he had ever seen, there was an accessory thyroid lying behind the sternum, and this had undergone colloid and calcareous degeneration. The patient was a woman of 48, who since her girlhood had suffered from winter bronchitis, and the question arose whether this was due to the presence of the accessory thyroid.

Dr. Martin, in his paper, had made the statement that there had never been any attempt made to remove cysts of the thyroid lying behind the sternum. Dr. Collins said that he published in the ANNALS OF SURGERY the history of his case, where he had operated on an accessory thyroid, which consisted of a mass of colloid cysts. In this case he was able to pass his fingers down to the arch of the aorta, and the entire mass was shelled out with the greatest ease. This mass, after its removal, measured three inches in length and an inch and a half from side to side. Its extirpation left a considerable space, showing where the large vessels springing from the arch of the aorta and the recurrent laryngeal nerve had been pushed to one side. Unfortunately, this patient developed pneumonia and died on the eighth day after the operation.

DR. ROGERS said that the extrusion of thick, stringy mucus, to which Dr. Martin had referred in his paper, was quite characteristic of all these cases. The speaker said he had recently operated on three intrathoracic cases, which had convinced him that these thyroid growths could be shelled out with much less danger than would appear, as they usually pushed aside the large vessels in their growth downwards. Also the vessels entering and leaving the tumor were generally close to the points found in the normal gland or close to the second or third tracheal rings.

DR. MARTIN, in closing, replying to Dr. Collins, said there were a large number of cases on record of the removal of intrathoracic thyroid growths; what he referred to in his paper was the removal of a single large cyst. In Kocher's 22 cases referred to in the paper, there was no instance of a single large cyst. The walls of some of these cysts were very thin and were apt to tear, and he believed the removal of the intrathoracic portion would be nearly impossible.

Stated Meeting, Held at the Roosevelt Hospital, March 22, 1911.

The President, DR. ELLSWORTH ELIOT, JR., in the Chair.

DOUBLE UNDESCENDED TESTICLE.

DR. JAMES I. RUSSELL presented a boy of eleven years who was admitted to the Roosevelt Hospital on March 31, 1909, with a double undescended testis. The scrotum was small, and the testis could be felt, one on either side, in the inguinal canal.

Operation: The right side was done first. An incision was carried down to the aponeurosis of the external oblique, which was carefully divided, and the testicle exposed. The internal epigastric artery and vein were ligated and cut, and a small amount of transversalis fascia was divided. The pelvic portion of the spermatic cord was now partly freed by traction and blunt dissection, allowing the testis to be pushed down into the scrotum. The upper part of internal ring was closed. The internal oblique was then sutured to the reflected portion of Poupart's ligament with No. 3 chromic gut interrupted sutures, the aponeurosis of the external oblique was sutured with con-

tinuous plain gut, and the skin was closed with silk-worm gut and continuous silk. No drainage was used. The left side was then treated in a similar manner.

The patient made an uninterrupted recovery, and there had been no retraction of the testes since the operation. But on the contrary at the end of two years in both cases of double orchidopexy the testes were at the bottom of the scrotum, showing descent during that time, since it was impossible to get them to the bottom of the scrotum at the time of operation.

Dr. Russell presented three other cases in which orchidopexy had been successfully done by him for the relief of undescended testes, in boys aged three, nine, and twelve years, respectively. In all of these, the undescended testicles had become arrested in the inguinal canal. In one, the condition was complicated by a congenital inguinal hernia, and in another by a double indirect inguinal hernia. In these cases, an operation similar to that described in the first case was done, and in all of them the result was excellent.

BILATERAL SWELLING OF BOTH HEELS.

DR. RUSSELL presented a boy of eighteen years, in whom, two years ago, both heels suddenly became painful and swollen. The swelling subsided somewhat during the next few days. Since the onset of his attack he had pains in his feet after walking, and went up and down stairs with difficulty. He complained of swelling in the back of both heels at the insertion of the tendo achillis. Denied gonorrhœa and syphilis; Wassermann test negative.

Examination showed a swelling involving the back of both heels at the insertion of the tendo achillis. The swelling was the size of a small orange; it was bony hard to palpation, not tender, and could not be moved upon the os calcis, to which it seemed intimately connected. There was marked limitation of flexion and extension of the ankle-joint. The X-ray showed a distinct shadow, globular in outline, but not of the density that palpation would suggest.

Dr. Russell said the condition being symmetrical, of bony consistence, not of gonorrhœal origin, and not similar to the gonorrhœal exostoses, it offered an interesting problem for diagnosis.

SARCOMA OF THE NASAL FOSSA.

DR. CHARLES H. PECK presented a man, 45 years old, who was admitted to the Roosevelt Hospital on February 7, 1911. Two months prior to admission he noticed that nasal breathing was obstructed on both sides, as though he had a heavy cold. The left side soon cleared up, but the obstruction on the right side persisted. A month later he was examined in the Out-patient Department, and on two occasions portions of an obstructing growth were removed by Dr. James E. Newcomb from the region of the right middle turbinate. Sections of the last specimen were examined by Dr. Mortimer Warren, and reported sarcoma. The patient's previous history was unimportant; there was no history of lues. Examination showed marked obstruction in the right nasal fossa; the nasopharynx and posterior nares were free.

Operation was performed by Dr. Peck on February 16, 1911, under intratracheal insufflation anæsthesia, which was administered by Dr. Charles A. Elsberg. An incision was made along the anterior border of the sternomastoid, and the right external carotid artery was ligated just above the origin of the superior thyroid. This wound was then closed by suture. An incision was then made along the junction of the nose and the right cheek, extending from just inside the inner canthus of the eye to the level of the anterior nares. It was deepened to the bone, and the periosteum was elevated until the nasal process of the maxilla was exposed, and this process was then removed with the chisel and rongeur. The nasal mucous membrane was then incised, and the middle, superior, and inferior turbinates, with the entire mucous membrane of the outer wall of the nasal fossa, including the growth, were excised. The growth was not well defined, but seemed to occupy chiefly the region of the middle turbinate and the adjacent portion of the ethmoid. The ethmoid was removed, including the inner wall of the orbit and the lachrymal bone. The inner wall of the antrum and a portion of the palate bone were also removed, and the mucous lining of the antrum was excised, as it seemed somewhat thickened and the cavity contained pus. During the removal of the ethmoid, the sphenoidal cells were broken into and explored, but they seemed to be free from the growth.

The incision was then extended upward a short distance, the frontal sinus was opened, and its lining membrane excised. It seemed somewhat thickened near the infundibulum, but normal elsewhere, and there was no pus in the cavity. The wound was then carefully closed with deep catgut and silk skin sutures, and drainage was established through the nostril by two strips of gauze, one leading to the region of the ethmoid, the other to the cavity of the antrum.

The operation lasted two hours and a quarter. The insufflation anæsthesia given by Dr. Elsberg was most satisfactory: the return current of air and ether kept the larynx absolutely free from blood and mucus, and it was most interesting to see fragments of tissue, which from time to time escaped into the pharynx, blown up with blood and mucus, so that they could be easily seen and sponged away. The entire absence of cyanosis and respiratory difficulty added greatly to the comfort of the operator, and undoubtedly lessened the shock to the patient. Between eight and nine ounces of ether were used after the commencement of the insufflation anæsthesia. Recovery from the anæsthetic was prompt, and there was little shock.

Excepting for œdema of the eye, which soon subsided, and a slight superficial infection of the wound, the patient's convalescence was uneventful.

Sections of the tissue removed showed that the tumor was confined to the region of the middle and superior turbinates and the nasal surface of the ethmoid. The lining of the antrum, the frontal sinus, and the lining of the deeper ethmoid cells showed no involvement. The pathological report was round-celled sarcoma.

Dr. Peck said that the exposure through the route employed was excellent. There was ample room to deal with the nasal fossa and all the accessory sinuses of one side. For larger tumors of the nasopharynx it would probably be insufficient. The small scar and absence of any considerable deformity of the nose or face was an advantage. The lower portion of the lachrymal duct was cut away, its open end being left free in the wound. It seemed quite possible that it had remained patent, as there was very little overflow of lachrymal secretion.

RUPTURE OF BRACHIAL PLEXUS: FIFTH, SIXTH, AND SEVENTH CERVICAL NERVES: NEURORRHAPHY.

DR. PECK presented a man, 33 years old, a professional bicycle rider, who was admitted to the Roosevelt Hospital on September 29, 1910. On September 5, while riding in a motorcycle race, he was thrown, his right shoulder striking a fence. There was a fracture of the clavicle, but no other bone injury, and the disability of the arm was attributed to this.

On admission, there was complete paralysis of all the muscles of the arm and forearm, with the exception of flexion of the first and extension of the second and third phalanges of the fingers. There was also slight pronation of the forearm. There was cutaneous anæsthesia, with the exception of (1) the area over the deltoid and axillary regions supplied by the superficial cervical and intercostohumeral nerves; (2) an area over the posterior surface of the forearm and dorsum of the hand; (3) over the middle, ring, and little fingers. There was a corresponding loss of pain, temperature, and muscular sensibility. There was a firm, hard mass in the posterior cervical triangle, about one inch above the clavicle, which proved to be a cicatrix surrounding the torn plexus. A fracture of the clavicle near its middle portion had united. All the muscles of the arm, forearm, and hand were much atrophied. The most severe pain was referred to the thumb.

Operation by Dr. Peck, October 3, 1910: The plexus was exposed and isolated from the surrounding structures, together with the dense mass of fibrous tissue in which it was imbedded. This was then carefully dissected until the fifth, sixth, and seventh nerves could be demonstrated on the proximal side, and the upper and middle primary trunks below. After freely excising the cicatrix until nerve tissue that seemed normal was reached, it was possible to coapt the fifth and sixth proximal segments to the upper primary trunks. The destruction of the seventh and the middle trunk was more extensive, but a strand which probably represented the anterior division of the middle trunk was sutured to the seventh cervical without great tension. The main part of the middle trunk was so much shortened after excision of the cicatrix that lateral implantation into the lower trunk, formed by the eighth cervical and first dorsal, seemed

the only possible resource, and this was consequently done. This trunk was not torn.

The wound was closed and the arm at first put up in vertical suspension, which was later changed to an elevated position, with the hand behind the head. This position was maintained until the fifteenth day. The wound healed promptly, and the patient left the hospital on the eighteenth day after operation. Daily use of the galvanic current, with massage, had been faithfully carried out, but no improvement in motion was noted until about February 1, 1911, four months after the operation. On February 9 he was able to supinate slightly, to attempt a little flexion at the elbow, and to move the fingers more freely. The pain referred to the thumb had been persistent and distressing.

An examination made on March 18 showed increased power in pronation of the forearm and flexion of the fingers and wrist, very slight extension of the wrist, slight supination, slight flexion at the elbow, and fairly strong adduction of the arm. Anæsthesia was still complete in the distribution of the musculospiral and circumflex nerves, and in part of the median and ulnar.

CICATRICIAL STENOSIS OF THE LARYNX FOLLOWING LARYNGOTOMY FOR SYPHILITIC PERICHONDritis.

DR. PECK presented a man, 33 years old, who was admitted to the Roosevelt Hospital on September 25, 1910. He had contracted syphilis twelve years ago, and underwent a short course of treatment at that time. Nine months ago his voice became husky, and he began to have spasmodic attacks of laryngeal dyspnœa. He was under treatment in two hospitals in this city with no appreciable relief of symptoms. Early in September the attacks of dyspnœa became more severe and frequent, and were accompanied by expectoration of blood. When admitted to the hospital, he was on the verge of asphyxiation, suffering from marked cyanosis, with intense inspiratory and expiratory dyspnœa. Laryngoscopic examination showed a great thickening of the epiglottis and arytenoids, with but a small chink for the entrance of air. A high tracheotomy was performed at once, with immediate relief. When the tube was removed, on the sixth day, the breathing and voice had improved, and the tracheal wound was allowed to close. He had been given heavy doses of mixed treatment from the time of his admission.

When the patient left the hospital, on October 14, 1910, he went on a spree and forgot to continue his treatment. He was readmitted on October 31, again suffering from severe dyspnoea. Examination of the larynx showed great swelling and infiltration of the entire larynx, most marked on the left side. The true cords could not be seen. On the following day, tracheotomy was again performed. On November 2 he was given 0.6 Gm. of salvarsan subcutaneously. Eight days later, a laryngoscopic examination made by Dr. James E. Newcomb and Dr. Edward L. Williamson showed little change in the local condition, but on November 16 a considerable improvement was noticed. Attempts to remove the tracheotomy tube were immediately followed by dyspnoea, which necessitated its replacement. On November 27 mixed treatment was resumed and continued until January 2, 1911, when he was given 0.6 Gm. of salvarsan intravenously.

Since that time the improvement in the laryngeal condition had been quite marked, but it had not been possible to do without the tracheotomy tube. Several attempts to intubate with large O'Dwyer tubes had failed on account of immediate expulsion of the tube. On February 6, under ether anaesthesia, a Rogers plugged tube was inserted; this was retained for 48 hours, when it had to be removed on account of pain and fever. On February 25 he was again anaesthetized, the stricture was dilated, and measurements were taken for a new plugged tube. On March 11 an attempt was made to insert this tube, but it failed, as the measurements had been faulty and the tube was too large.

On March 18, Dr. John Rogers, at the request of Dr. Peck, after dilating the larynx under anaesthesia successfully intubated with a specially long tube which was not plugged; this was now in place and the patient was able to breathe easily through it. He had learned to swallow fluids in the Castleberry position, and was beginning to take soft solids.

Dr. Peck said that after watching Dr. Rogers's skilful introduction of the tube, he had found that his own failures had been largely due to the fact that he had not gotten the tubes far enough down in the larynx. The plan was to replace the present tube in a short time with one of the same length and shape, but of slightly larger calibre, increasing the calibre with each new

tube until the full dilatation was obtained. Dr. Rogers had told him that the cure of such a stricture usually took from two to three years, but that a permanent cure might be confidently expected.

POPLITEAL ANEURISM: ENDO-ANEURISMORRHAPHY
(OBLITERATIVE).

DR. PECK presented a married man, 33 years old, a painter by occupation, who was admitted to the Roosevelt Hospital on February 2, 1911, complaining of a tumor in the right popliteal region. Six weeks before admission the right foot and leg became swollen, and he had noticed for the first time a swelling in the popliteal space. This had not been painful excepting for slight pain back of the knee when the leg was fully extended; it was slightly tender. He denied a specific history, but the Wassermann reaction was positive. There was no history of trauma.

Upon examination the right leg was found to be swollen, the circumference of the right calf being 40 cm. and that of the left 35 cm. In the right popliteal space there was a rounded swelling, about two and a half by three inches in diameter, with expansile pulsation, systolic thrill, and a loud bruit.

A Matas-Moskovitz test of the collateral circulation, compressing the femoral over the pubic arch while the Esmarch bandage was applied from the tips of the toes to the upper border of the aneurism and then released, showed a return hyperæmic wave to the toes in three and a half minutes. As no suitable arterial compressor was available at this time to occlude the artery just above the aneurism for this test, a further test by the use of the Halsted metal band, placed on the femoral low in Hunter's canal, was made as the first step of the operative procedure.

Operation, February 4, 1911: The right leg and thigh were tightly bandaged with an Esmarch rubber roll from the toes to Scarpa's triangle, and a tourniquet applied as high on the thigh as possible. The Esmarch was then removed, leaving the thigh and leg blanched and the aneurism stilled. The femoral artery was then exposed low in Hunter's canal, and a Halsted metal band was applied and tightened to obliterate the lumen. The tourniquet was then removed. The hyperæmic blush came

with a rush to a little below the level of the band, and then advanced more slowly: it reached the tubercle of the tibia in one minute and twenty seconds; the middle of the calf in two minutes, and the malleoli in about four minutes, but it was eleven minutes before the toes were pink, the great toe being still quite blanched when the operation was proceeded with.

The tourniquet was reapplied, and with the patient in the prone position the aneurismal sac was laid freely open and the clot evacuated. The aneurism was fusiform in shape, with no vestige of normal arterial wall connecting the openings of entrance and exit of the main vessel. A deep sacculation extended forward above the head of the tibia. Both openings were sutured with two tiers of No. 0 chromic gut, and the deeper portion of the sac, with the openings of small collaterals, was obliterated by superimposed continuous sutures of the same material. The redundant walls of the superficial portion were then brought in contact with mattress sutures of heavier chromic gut, and the wound was closed without drainage.

On removal of the tourniquet before suture of the soft parts, hæmostasis was found to be perfect. The wound over the artery, which had been closed by temporary sutures, was then reopened, the metal band was removed, and the wound closed by suture. Inspection of the popliteal wound after this procedure showed no fresh bleeding. The main wound healed primarily, but there was a superficial infection in the wound over Hunter's canal. The collateral circulation was perfect, and the foot, though somewhat pale, was warm from the first. Convalescence was uneventful, and the patient was allowed out of bed 21 days after the operation.

Dr. Peck said that the preliminary testing of the collateral circulation, so strongly urged by Matas before proceeding with an operation which was likely to result in obliteration of a vessel, seemed most important. The method employed in this case might be unnecessary if proper apparatus was available to effectually compress the main vessel just above the aneurism. Nevertheless, this was perhaps a more perfect test. Abundant experimental work by Halsted, Matas, and others had shown that if properly applied, the bands could be put on tightly enough to completely occlude the artery, and could be removed at any time within 72 hours without damage to the intima or the integrity of the vessel wall.

Dr. Peck said he thought the employment of the band for temporary or partial occlusion of important vessels had a field of usefulness which was not yet thoroughly appreciated.

RADIOGRAPHS AFTER GASTRO-ENTEROSTOMY.

DR. PECK showed a number of radiographs taken by Dr. Edward Leaming, Attending Radiologist to the Roosevelt Hospital, illustrating the present gastric condition in patients who had been operated on by gastro-enterostomy after the lapse of various intervals. These pictures were taken after the patients had swallowed an emulsion of bismuth, so that the outlines of the stomach were clearly defined. Three radiographs were taken of each patient at intervals of 2, 15, and 30 minutes after taking the bismuth gruel. In all of the six cases presented, prompt emptying of the stomach through the gastro-enterostomy opening was shown. Bismuth showed plainly in the upper jejunum in the plates taken within two minutes, and after 30 minutes the stomach was nearly emptied.

FRACTURES AND DISLOCATIONS TREATED BY THE OPEN METHOD.

DR. A. V. S. LAMBERT showed a series of these cases, in which the technic employed by him differed somewhat from any he had seen described. The holes in the bones were made by means of a twist drill, such as is used by metal workers. This cut a clean hole in the bone, and did not cause a crushing of the trabeculæ alongside of the hole, as did the ordinary bone drill. This twist drill was accurately graded for the proper sized screw, and made a hole the exact size of the shank of the screw. He then used a tap, which, being made of very highly tempered steel and provided with a sharp cutting edge for the thread, cut a groove or thread in the bone at the sides of the drill hole, and here again all crushing of the trabeculæ was avoided. The machine screws that were used had the same thread as that of the tap, and were very easily inserted with scarcely any friction or resistance until the final twist was given to them in screwing them tight to hold the plate. These screws, when applied in the above manner, had a greater holding power than did the wooden screws so universally used. The speaker said he used a No. 6 machine screw with a 30 thread, in the smaller bones, and a No. 8 machine screw with a 24 thread, for the larger bones.

Dr. Lambert said that this series of cases was treated at the Roosevelt Hospital, in the service of Dr. Charles H. Peck.

CASE I.—Fracture of the shaft of the femur, upper third. Fracture of the shaft of the tibia and fibula, middle third. Open reduction. This patient was admitted to the hospital on September 14, 1909, with the following history: On June 29, 1909, ten weeks before admission, he was in an automobile accident and fractured both bones of the leg and also his femur. He was treated by splints, traction motion, and other means, but at the end of treatment he had no union in any of the fractures, and there was four inches shortening.

On September 15, 1909, he was operated on by Dr. Lambert, and the tibia and femur were placed by means of aluminum plates and machine screws. It required considerable traction and manipulation to overcome the four inches of shortening. The wound was closed without drainage and healed by primary union. The splints were removed at the end of twelve weeks, when union was firm and the position of the fragments was perfect.

CASE II.—Fracture of the shaft of the femur, middle third. This was a girl, seven years old, who was admitted to the hospital on May 4, 1910, with the following history: On the day of admission she was knocked down by an automobile and sustained a fracture of the left femur. After traction for two weeks there was still two inches of shortening, and the X-ray showed pronounced displacement.

Operation, May 18, 1910: An aluminum plate was fastened to the bone by machine screws. During the manipulation, a small fragment of bone was broken off from the upper end of the lower fragment. The wound was closed without drainage, and healed by primary union. The cast was removed at the end of the sixth week, when union was complete and the fragments in perfect position.

CASE III.—Fracture of shaft of the femur, middle third. The patient was a girl, ten years old, who was knocked down by an automobile on the day of admission, sustaining a fracture of the femur. After two attempts at reduction, the X-ray showed an oblique fracture, with small fragments and comminution, and one inch overriding.

Operation, December 3, 1910: The fragments had an oblique

FIG. 1.



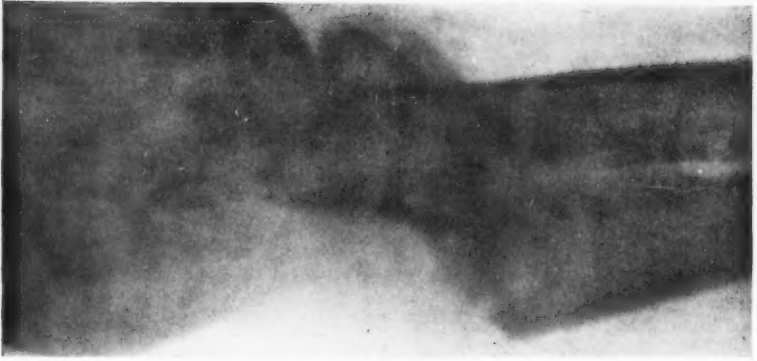
Deformity remaining six months after injury. External view.

FIG. 6.



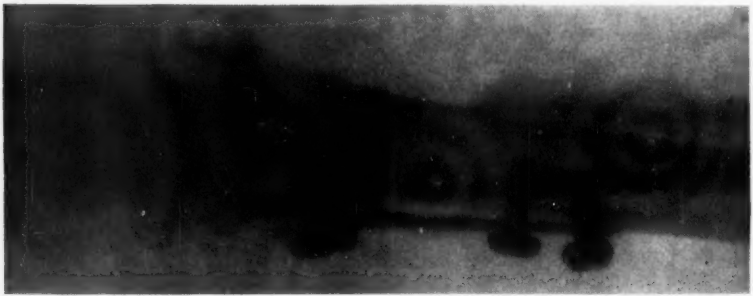
External appearance after treatment.

FIG. 2.



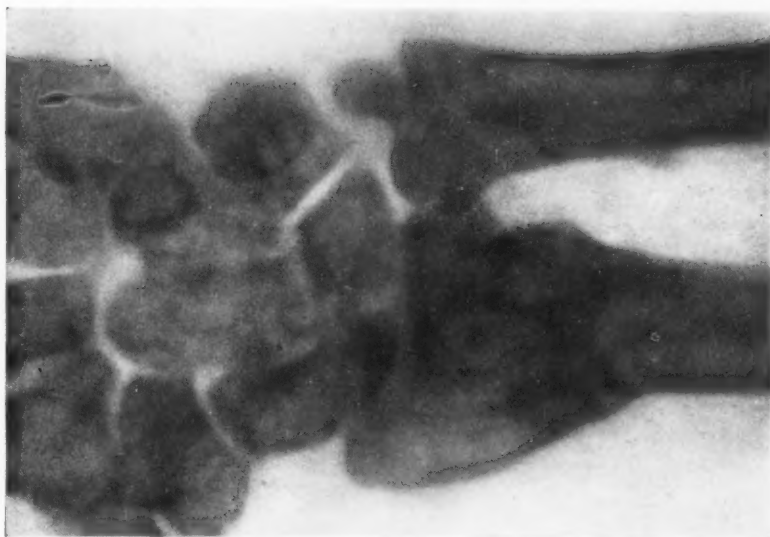
Skiagraph showing amount of displacement of lower fragment of radius. Lateral view.

FIG. 5.



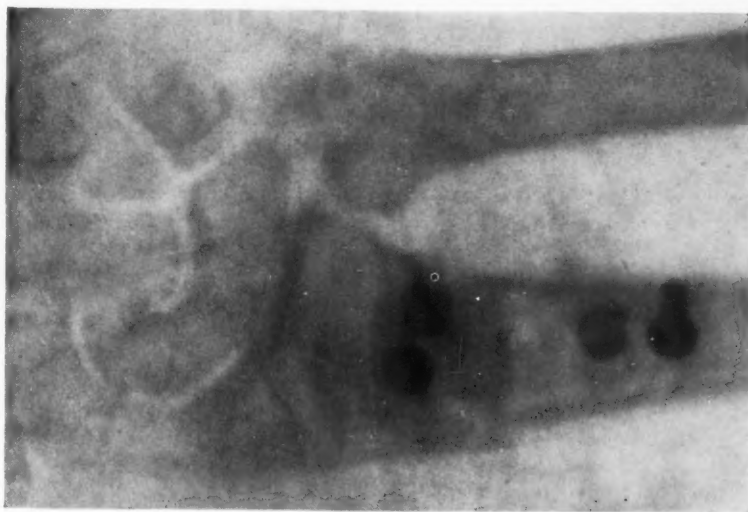
Lateral view. Fracture reduced and fragments fixed by plate and screws.

FIG. 3.



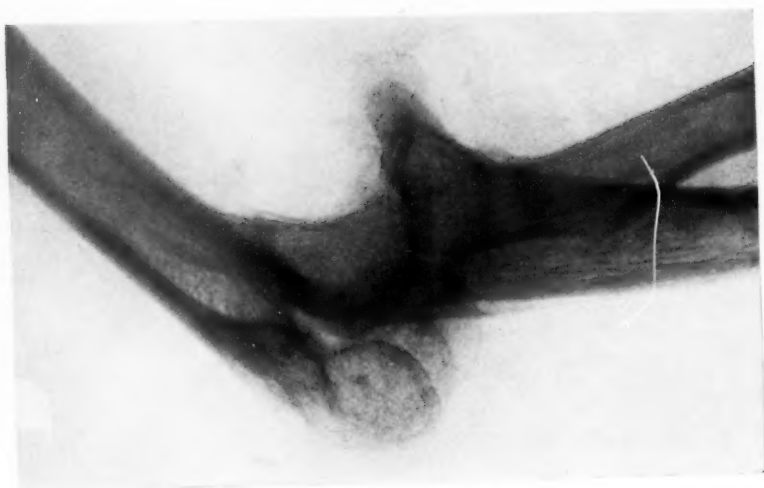
Skiagraph giving anteroposterior view of fracture of lower end of radius, before operation.

FIG. 4.



Anteroposterior view after reduction by open operation and fixation by plate and screws.

FIG. 7.



Dislocation of elbow; both bones forward.

line of fracture, and a small fragment from the posterior surface of the upper fragment made it possible to approximate the anterior edges only, leaving a gap on the posterior surface. With the aluminum plate and machine screws, the fragments were held in good position. The wound was closed without drainage, and healed by primary union. The cast was removed on January 3, 1911, when union was found to be complete.

CASE IV.—Fracture of the shaft of the femur, lower third; ankylosis of the knee-joint: open reduction.

The patient was a woman, 41 years old, who was admitted on January 7, 1910, with the following history: Three days previous to admission she slipped on the icy pavement and fell; her right leg, which had been ankylosed for 33 years, bent under her, and she felt the bone break above the knee. Examination showed a fracture of the lower third of the left femur, with crepitus and false point of motion. The lower fragment was found posterior to the upper. The knee was ankylosed to an angle of 150° , and showed a slight posterior subluxation of the tibia.

The patient was anæsthetized on January 8, 1910, and again six days later, and on both occasions an ineffectual attempt was made to bring the fragments into position and to maintain reduction with a plaster cast and spica. The great difficulty encountered in maintaining reduction was the ankylosed knee.

Operation, January 19, 1910: The parts were exposed, and an aluminum plate was fastened to the bone with machine screws. The wound was closed without drainage and healed by primary union. The cast was removed after eight weeks, when perfect union was found to exist.

CASE V.—Old fracture of the lower extremity of the radius. Colles. The patient was a man who was admitted to the hospital on February 13, 1911, with the following history: Six months prior to admission he fell, fracturing his forearm just above the wrist. It was immobilized for two weeks, and since then he had limited motion and a painful wrist. There was a marked "silver fork" deformity of the left wrist (Figs. 1, 2, and 3), with a point of tenderness over the outer side of the radius, one inch above the wrist-joint. No crepitus; no false point of motion.

Operation, February 17, 1911: Two incisions were made, one over the postero-external aspect, and a second over the antero-

external aspect. The impaction was broken up with difficulty, and reduction was accomplished only after prolonged traction, manipulation, and division of the periosteum and callus on the posterior surface. The two fragments were in contact only along their anterior borders, as there was a loss of substance on the posterior portion of the lower fragment, due to crushing following the impaction.

A plate of aluminum having a curve corresponding to that of the normal anterior surface of the radius was firmly screwed to the two fragments by means of four machine screws. (Figs. 4, 5 and 6.) The wound was closed without drainage and healed by primary union. Function now is only slightly restricted in supination, otherwise normal.

CASE VI.—Forward dislocation of both bones of the elbow: open reduction. The patient was a boy who was admitted to the hospital on December 17, 1910, with the following history: Fifteen weeks previous to admission he fell during an epileptic seizure, striking his right side and dislocating his left elbow, both bones being displaced backwards. The dislocation was reduced in the accident room. A month later he had a similar injury, which was reduced by a private physician. Five weeks ago he again fell, striking on his left elbow and injuring it for the third time. This was treated by a private physician, who said he reduced it and then placed the arm in a plaster splint.

Upon his admission to the hospital, it was found that the patient was unable to flex or extend the forearm. Pronation was possible to a limited degree, and supination was very limited. There was also ulnar nerve paralysis. The lower end of the humerus was readily palpable beneath the skin on the posterior aspect of the arm. The bones of the forearm could be made out anteriorly (Fig. 7), but their anatomical landmarks could not be identified distinctly on account of the overlying soft parts.

Operation: The orbicular ligament was found unruptured; the triceps was only partially detached from the olecranon, and was stretched very tensely over the inner border of the humerus. The ulnar nerve was not seen during the operation. The internal epicondyle, which was detached from the humerus and attached to the coronoid of the ulna, was removed. The bones were then replaced, and the wound closed without drainage. It healed by primary union, and passive motion was commenced on the ninth day.

FIG. 8.

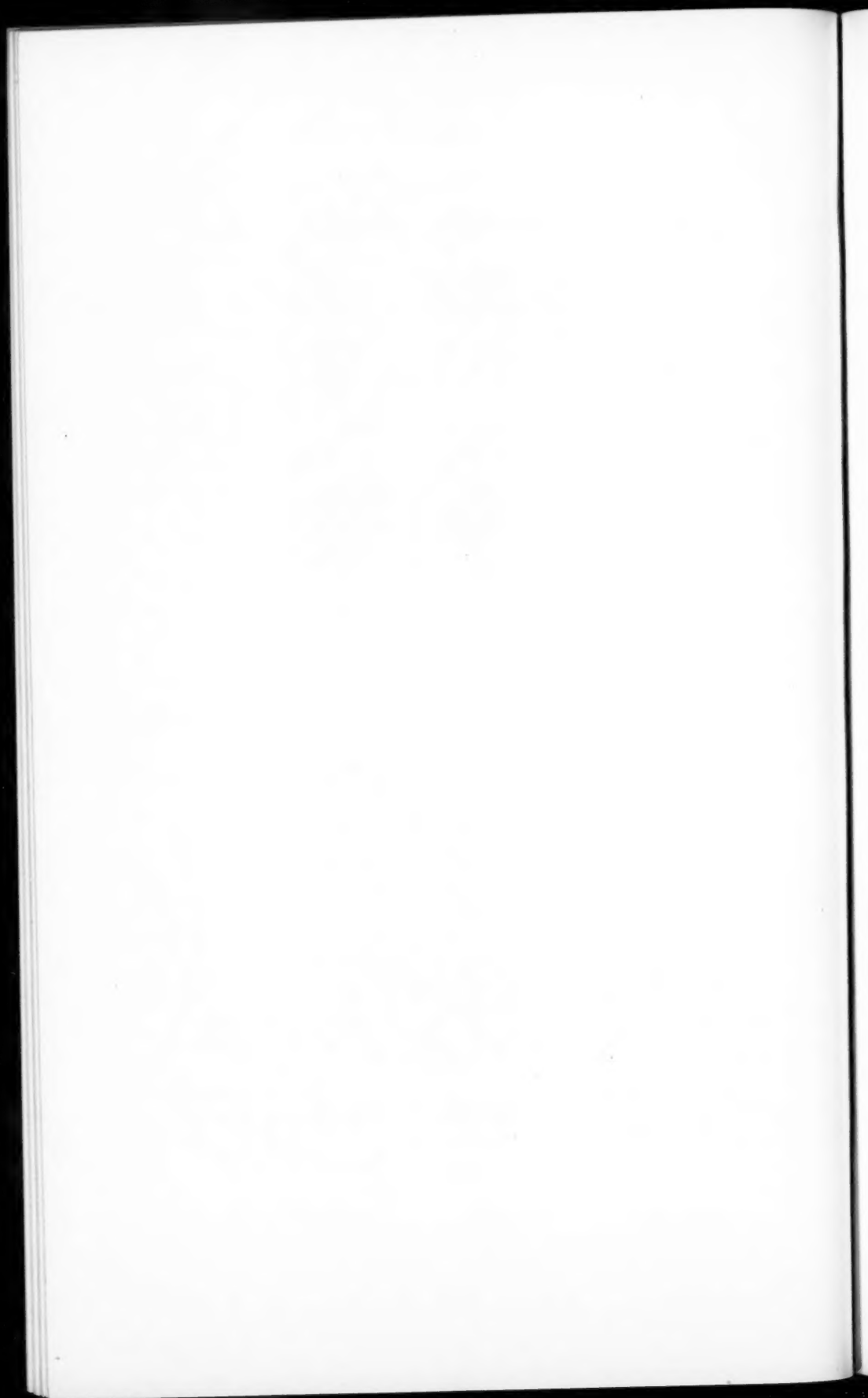


Epithelioma of lip before operation.

FIG. 9.



Result of plastic operation for replacing a lower lip which had been removed by operation.



The patient now had complete flexion, supination, and pronation, but extension was limited to 170° . The ulnar nerve paralysis was still present, and showed no improvement.

PLASTIC OPERATION FOR REPLACING A LOWER LIP WHICH
HAD BEEN REMOVED FOR CANCER.

DR. CHARLES N. DOWD showed a man whose entire lower lip had been removed for epithelioma six months previously. He was shown to illustrate the advantage of replacing the defect by flaps drawn forward from the lower part of the face on each side. The method was described several years ago (*The Medical Record*, Feb. 20, 1897), and the results obtained by it had been excellent, several of the patients having gone a number of years without recurrence. Good access was obtained to the submaxillary regions, from which the lymphatics were carefully removed. Sufficient skin to cover the defect was slid forward from the sides of the face, and the mucous membrane for forming the vermilion border of the lip came from the inner side of the cheeks. Redundant tissue was removed by taking a wedge-shaped piece at the nasolabial fold.

The patient's appearance before and after operation was shown in the accompanying photographs. (Figs. 8 and 9.)

SEPTIC KNEES (THREE CASES).

DR. CHARLES N. DOWD showed three cases to illustrate the two following points in the treatment of suppurating knee-joints: (1) that in certain instances, drainage through small incisions was more desirable than an extensive operation; (2) that if the cutting of the patellar ligament and a wide exposure of the joint were deemed wise, ankylosis did not necessarily follow in children.

CASE I.—The patient was a fairly robust man, who was subject to pharyngeal inflammations and had a peritonsillar abscess, which was incised May 16, 1910. He was admitted to the Roosevelt Hospital on May 22, and remained on the surgical division for four days, running a high temperature. He was then transferred to the medical division and treated for a pneumonia which had developed. On June 3 he was sent back to the surgical division for the treatment of a suppurating knee-joint.

Under these conditions, Dr. Dowd said, some surgeons would have advised opening the joint very widely, washing it out, and establishing thorough drainage; others would make a very small incision for drainage, and carefully avoid doing other injury or violence to the joint. Again, others would aspirate the pus and inject some antiseptic fluid.

Dr. Dowd said he was guided in his procedure by the general condition of the patient. Although he had shown three foci of infection, the peritonsillar abscess, slight pneumonia, and supuration of the knee, he did not look very septic. His temperature, which at first had for several days been about 104° , had fallen to 100.8° , and his pulse was 80. It seemed wiser to be guided by this than by his multiple foci of infection, or by the fact that streptococci had at first been found in the blood and in the pus from the knee. Therefore, under nitrous oxide anæsthesia, a small incision was made in each side of the joint. Coagulæ, which were seen within the joint, were not even disturbed, the margins of gauze strips were inserted within the synovial incisions, an absorbent dressing was applied, and the leg immobilized.

Drainage was obtained with the minimum of traumatism in the belief that the patient could thus fight his sepsis better than he could if his knee received too much trauma, somewhat as we find that appendix cases do better when the general peritoneum is not unnecessarily disturbed.

The patient's convalescence was slow, but he had far less suffering than patients with septic knees usually had. He left the hospital at the end of two and a half months with his wounds healed and his knee stiff, but permitting a few degrees of motion (about 15°). During this period, another evidence of his septicæmia had appeared in the shape of an abscess in the neck, which contained streptococci, and which had been incised and had healed.

Since last September the patient had been at work most of the time. His knee had been baked a good deal, and he now walks very well, holding his leg fully extended and having 20° of voluntary flexion in the knee-joint.

CASE II.—This was a strong negro, 32 years old, who on June 30, 1910, was shot diagonally through the leg, the bullet grazing the knee-joint and going through the tibia. When he

came to the hospital, ten days later, he had a suppurating bullet wound, and the knee was distended with streptococcic pus. His temperature was 103.8°, pulse 90.

On exploring the bullet wound, it was found that this was the cause of at least a large part of his symptoms, and silkworm gut strands were accordingly passed through the bullet track in the bone to secure suitable drainage. The problem which he presented was similar to that of the preceding case, as he had a suppurating knee-joint and symptoms due in part to that and in part to other lesions. The joint was therefore drained with the minimum of tissue disturbance, and the leg was immobilized.

The subsequent illness in this case was more trying than that of the first patient, but his symptoms were due to infection about the joint and the bullet wound, not to inflammation within the joint. At the end of four weeks, in spite of most careful dressing and efforts at drainage, there was so much boggiess of the leg and the constitutional evidences of sepsis were so pronounced that a second operation was done. Much periarticular inflammation was present, and there was a posterior abscess which burrowed above the popliteal space. In order to avoid possible error concerning the knee itself, a cut was made across the patellar ligament and the joint was inspected and found to be in excellent condition. Its upper part was filled in with granulation tissue and almost obliterated; there was no pus between the bones or in the posterior part of the joint, and the bones were in good condition.

The leg was immobilized in flexion, with the patella laid upward, but after six days it was straightened without resection of the bone, and healing slowly followed. The wide exposure of the joint was made as a diagnostic safe-guard, but the absence of intra-articular inflammation and the prompt relief which followed drainage of the periarticular abscesses indicated that this exposure served no other good purpose. The patient's convalescence was slow but uninterrupted, and he left the hospital two and a half months after his admission. He had received massage and baking since, and now had a straight leg with ankylosis of the joint.

Dr. Dowd said the treatment of these cases by simple incision was entirely in accord with the teachings of Peck (*ANNALS OF SURGERY*, vol. xlv, p. 409) and Mayo (*Loc. cit.*, vol. xxi, p. 37),

who had, under certain conditions, advocated the division of the patellar ligament in order to secure abundant drainage. Dr. Peck particularly drew attention to Flint's studies, with his report of 62 cases of suppuration of the knee, with 89 per cent. of recovery after various procedures, and he reserved the transverse operation for those cases that had been suffering for a long time, and whose infection had been severe from the onset and in whom the joint was disorganized. The transverse drainage, however, was so attractive a procedure that there might possibly be a tendency to use it in patients who would do better by the simple drainage.

CASE III.—Dr. Dowd said this case illustrated the possibility of obtaining good motion after severe suppuration and extensive surgical procedure in the joints of children. This patient had already been shown at a meeting of the Society on March 24, 1909, when he had partially regained his power of motion, and he was now shown with a degree of motion which was remarkable. In November, 1908, when he was six years old, a transverse incision was made into the knee-joint for a very virulent infection (*ANNALS OF SURGERY*, vol. 1, p. 482). The leg was immobilized in flexion, with wide drainage of the joint, and was straightened without bone resection three weeks later. Four months afterwards, when the patient was presented before the Society, he walked fairly well, having about 30° of motion. In the intervening two years he had played about, as boys generally did, and had had no definite treatment. He was now able to walk and run so well that one could not distinguish that he had ever had a knee-joint operation. He was able to extend the leg almost to the normal position, and had at least 50° of voluntary motion (see Figs. 10 and 11). He walked and ran without limping, and stated that he did not become unduly tired. The patella was situated one inch higher than that in the opposite knee, but this did not seem to occasion him any inconvenience.

CHOLELITHIASIS; LIVING TYPHOID BACILLI FOUND IN
GALL-STONES THIRTY-TWO YEARS AFTER THE FEVER.

DR. CHARLES N. DOWD presented a man who was admitted to the Roosevelt Hospital in August, 1910, having had attacks of biliary colic for 20 years. He gave a history of having had typhoid fever 32 years ago.

FIG. 10.

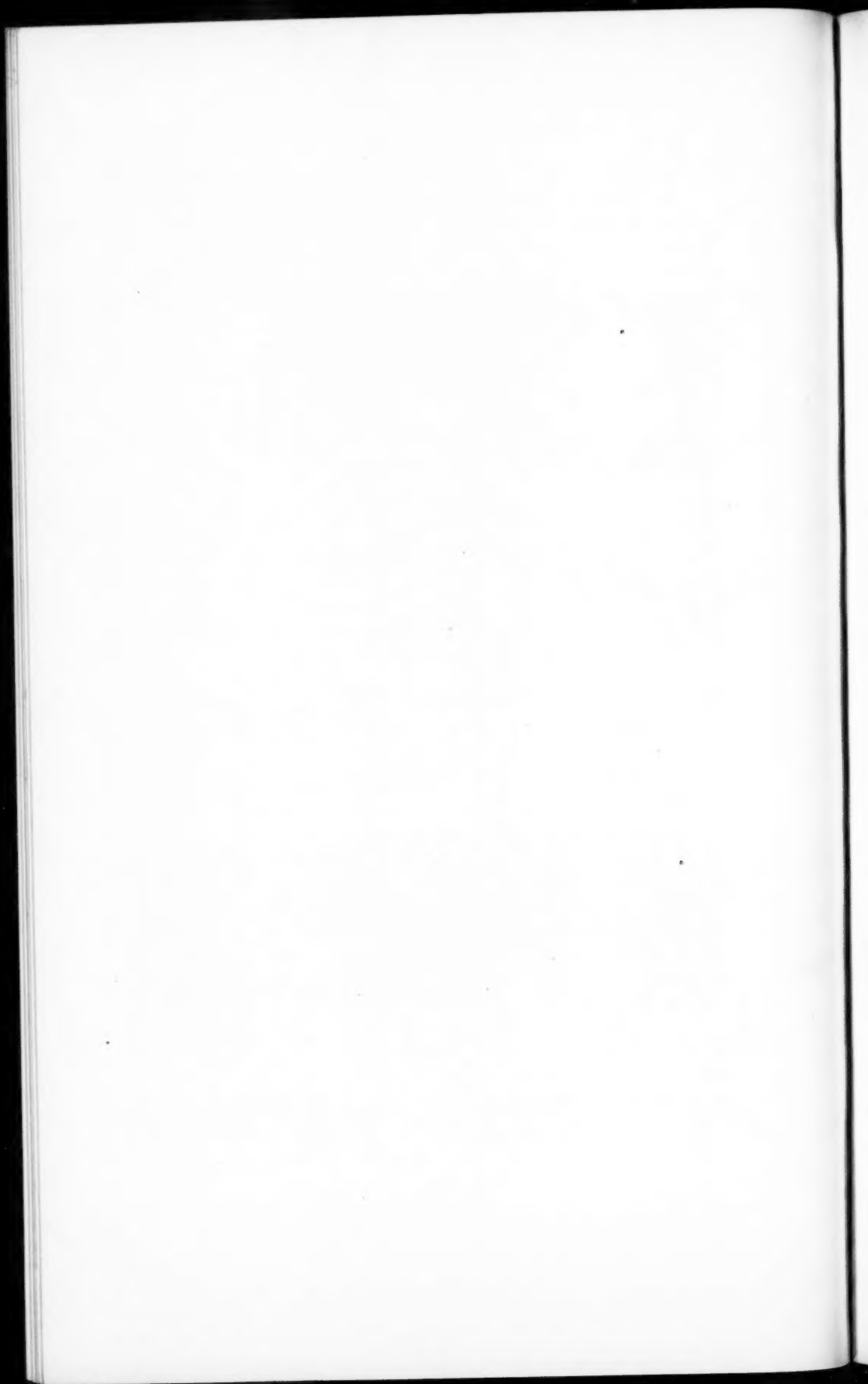


Result of transverse incision and drainage of child's knee-joint for severe suppuration. Flexion.

FIG. 11.



Result of transverse incision and drainage of child's knee-joint for severe suppuration. Extension.



At operation, two large gall-stones were removed, one and a quarter inches in diameter, together with several small ones. As living typhoid bacilli had so frequently been found within gall-stones, one of the larger stones was sent to the laboratory for bacteriological examination. From its interior, cultures of living typhoid bacilli were obtained, which grew in the characteristic manner. Of course, no one could tell the exact time when they had formed the nidus of the gall-stone, but the period must have been a very long one.

This case, the speaker said, offered another example of the long persistence of the living typhoid bacilli in the gall-bladder. The long viability of these bacilli had been so often demonstrated that this instance, remarkable as it was, did not occasion so much surprise as it otherwise would. The prolonged duration of typhoid contagion in typhoid carriers was a matter of general knowledge. The Health Department of this city had recently traced a case back 47 years, and Lenz (*Clinical Jahrbuch*, 1905, vol. xiv, p. 475) had related a case where it persisted 42 years.

POST-OPERATIVE DEVELOPMENT OF HYPERPLASTIC LYMPH-NODES.

DR. CHARLES N. DOWD presented a child who was operated upon three years ago for tuberculosis of the cervical lymph-nodes. The subparotid nodes were extensively involved in the tuberculous inflammation, and they, together with those of the internal jugular and posterior cervical chains, were removed in the usual way.

The patient was shown to illustrate the development of hyperplastic nodes which frequently came after extensive lymph-node operations. It was not unusual to find a few small nodes, the size of peas or small beans, at the margins of the operative area. Dr. Dowd said he had watched such nodes, in many instances, for a number of years, and had found that they remained almost quiescent, sometimes subsiding and very rarely increasing in size. At times, the physicians and the patient's friends were anxious about them, but they were so seldom tuberculous that they had not often been removed, and when such nodes had been removed, microscopic examination had usually shown them to be non-tuberculous.

The patient shown by Dr. Dowd was a child, who a year

and a half after his operation developed caries of a tooth, and later, inflammation in the surrounding tissues. Last November, he came to the hospital with a bean-sized node directly in the locality from which the lymphatics had been removed in the previous operation. Fearing that it might indicate a recurrence of tuberculosis, it was removed. Both macroscopic and microscopic examination, however, failed to show any evidence of tuberculosis. The node had apparently developed in response to the tooth infection, forming a lymphatic protection. It showed the same kind of enlargement which lymph-nodes ordinarily showed in the vicinity of simple pyogenic infection.

The development of these nodes corresponded to what we would expect and what had been learned from animal experimentation, for it was beyond doubt that lymphatics had good power of regeneration, and that they thus met the demands which were put upon them.

OMENTAL CYST.

DR. CHARLES N. DOWD read a paper with this title.

SOME OBSERVATIONS UPON THE SURGERY OF THE URETER.

DR. GEORGE E. BREWER read a paper with this title, for which see page 827. In connection with his paper, Dr. Brewer showed a number of cases illustrating the same.

TRANSACTIONS

OF THE

PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting held February 6, 1911.

DR. GWILYM G. DAVIS in the Chair.

DISJUNCTION OF UPPER EPIPHYSIS OF ULNA.

DR. PENN G. SKILLERN related the history of a boy aged 9 years who presented himself at the surgical dispensary of the Children's Hospital September 10, 1909, with the history of a fall from a height of 10 feet onto his left elbow. In the absence of Dr. Ashhurst he was examined by Dr. Skillern, who discovered moderate pain, moderate swelling about the elbow, and localized tenderness at the upper extremity of the ulna. At this point a small fragment corresponding to the olecranon tip could be grasped and moved from side to side. Between this fragment and the triangular subcutaneous surface of the olecranon was a depression admitting the tip of the little finger, which was rendered more distinct on flexing the forearm and diminished by extending it. Approximation of the fragments in complete extension elicited muffled crepitus. The arm was splinted in complete extension and the epiphysis held in juxtaposition with the bone by an adhesive strip. A skiagram revealed disjunction with slight mesial displacement of the upper epiphysis. (Figs. 1 and 2.)

Dr. Skillern said that this injury is not mentioned in the textbooks or in the literature of surgery. It is, however, referred to in Piersol's "Anatomy" (p. 285), and receives full consideration in Poland's work on "Traumatic Separation of the Epiphyses" (p. 457), in which it is stated that: "the olecranon epiphysis is but a small process, occupying little more than a third of the whole olecranon at about the tenth year. In this cartilage ossification appears at the summit of the olecranon as a single nucleus usually at this period—in rare cases a year or two sooner—and rapidly invades the whole. In the fully ossified state, at the

fifteenth year, the epiphysis comprises the upper aspect of the olecranon with the insertion of the triceps, part of the attachment of the posterior ligament of the elbow-joint, and a small portion of the upper part of the triangular subcutaneous surface posteriorly; on the inner side it is above the tubercle for the flexor carpi ulnaris. The epiphyseal line slopes obliquely downward and backward from the articular surface in front, viz., the upper part of the sigmoid cavity. The epiphysis unites with the shaft at the seventeenth year.

"In regard to age, separation of the whole cartilaginous upper end of the ulna is possible only before the eight year or thereabouts, and pure separation of the olecranon epiphysis can only occur from about the tenth year to the seventeenth or eighteenth, the time of junction with the epiphysis. The rarity of this injury in children, as compared with fractures of the olecranon process in adults, may be accounted for to some extent by the small size and less prominent projection of this process in the former. The posterior aspect of this epiphysis in children before the fourteenth year is on a plane anterior to that of the epicondyles and posterior aspect of the diaphysis of the humerus when the elbow is at a right angle. Consequently, in falls upon the elbow and in other injuries, the force of the blow is much more likely to be received by the epicondyles than by the olecranon.

"The injury is commonly caused by a fall upon the back of the elbow while the elbow is in a flexed position, or by some other direct blow. From indirect violence, either extreme flexion or hyperextension of the elbow may cause disjunction. As for muscular action, it is questionable whether in children violent contraction of the triceps brachii is sufficiently powerful to detach this process, unless it be combined with one or other of the causes mentioned above."

The symptoms, prognosis, and treatment of this disjunction do not differ essentially from those of fracture of the olecranon.

Even fractures of the olecranon before the fifteenth year are rare. Thus, in the table of 2705 fractures treated at the Middlesex Hospital during sixteen years inserted by Flower and Hulke in Holmes's "System of Surgery" (1881, vol. i, p. 845), 76 of the 2705 were fractures of olecranon, and of these 76, 10 occurred before the fifteenth year. The diagnosis of disjunction in this

FIG. 1.



Skiagram of ulna showing separation of upper epiphysis.

- (a) Adhesive strip applied over epiphysis.
- (b) Disjunct epiphysis.

FIG. 2.

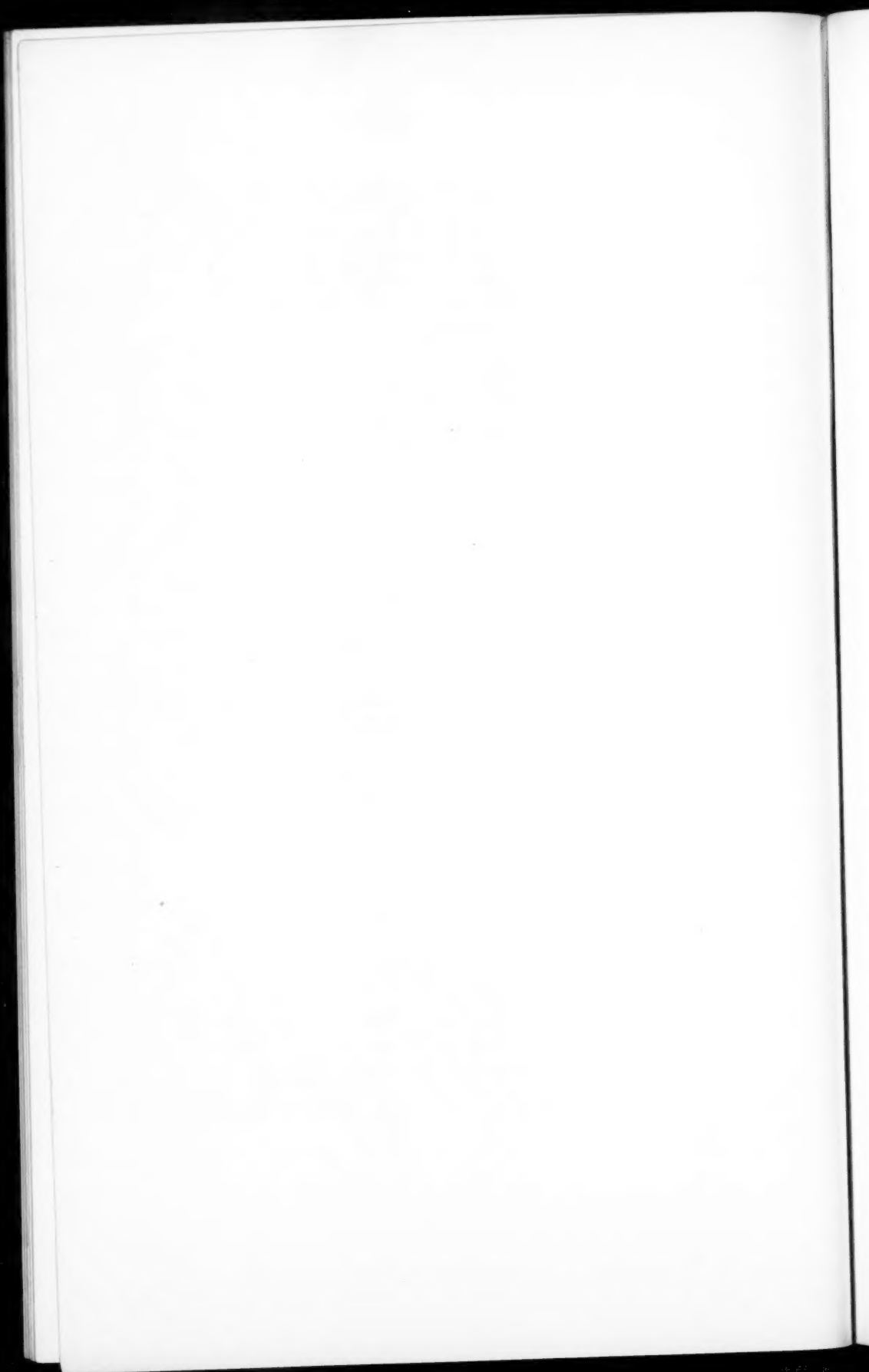


Skiagram of ulna, showing separation of upper epiphysis.

FIG. 3.



Sketch of an ulna from a lad fourteen years of age. Shows extent of olecranon formed by upper epiphysis.



case was suggested by the fact that the patient was in the epiphyseal age,—an important consideration, since, as Poland states, the annual surgical reports of several of the London hospitals mention in their statistics numerous cases of fracture of the olecranon before adolescence, many of which were probably examples of epiphyseal separation. The point may be raised that here, in the case of the olecranon, it is rather an affair more of academic interest than of practical import whether disjunction or fracture has occurred, since in disjunction the growth of the ulna is not interfered with. Yet the speaker thought that many epiphyseal disjunctions in children, especially where no skiagram is made, are mistaken for fractures, and that on the whole it is far better to recognize disjunctions than to stop short of further investigation and diagnose and treat as a fracture. His own working rule in this respect is that since all minors are in the epiphyseal age, severe injuries about the joints should be considered epiphyseal disjunctions until proven otherwise. It is well known that epiphyseal disjunction is more apt to occur than dislocation in childhood, because the epiphyseal unions are weaker than the articular. He believes that in the future epiphyseal disjunctions should be accorded a more prominent place in the text-books than at present. The accompanying sketch (Fig. 3), made by Mr. Erwin Faber, of an ulna from a child aged fourteen, shows just how much of the olecranon is formed by the upper epiphysis.

Examination of the patient at the present time, eighteen months after the injury, reveals perfect function of the elbow-joint.

LAMINECTOMY.

DR. GEORGE P. MULLER read a paper with this title, reporting six cases, for which see page 754.

THE RATIONAL TREATMENT OF ACUTE APPENDICITIS.

DR. JOHN B. DEEVER read a paper with this title, for which see page 798.

DR. JOHN H. GIBBON said that the figures of Dr. Deaver point to the value of the Ochsner method of treatment after peritonitis is established. In only a limited number of cases had he himself pursued this policy. It may be of interest in this

connection to take the cases of acute appendicitis (all chronic cases being excluded) occurring in the Pennsylvania Hospital during the past two years, and see what results were obtained there. As a general rule all cases were operated on within a few hours, excepting abscess cases. In considering the mortality of this class of cases it is necessary to include the mortality of cases dying without operation.

These cases had been tabulated by Dr. Billings. These operations have probably been performed by eight different surgeons, comprising the surgical staff of the hospital.

There were 40 acute cases with acute symptoms; nothing outside; no pus. All recovered, being operated upon in an average time of $1\frac{3}{4}$ hours after admission. These all come within the 36-hour period. Next, serious acute cases, suppurative, without definite abscess wall; 33 of these operated on; average time after onset $2\frac{1}{3}$ days; all recovered. Thirty-five cases of appendiceal abscess with well-defined wall and cavity, but no diffuse peritonitis; average time after onset 5 days; all recovered. Of the acute gangrenous cases, there were 39 of these, average time after onset of disease being 2 days. All were operated on within 2 or 3 hours after admission, and all recovered. Of the acute gangrenous cases with perforation of the appendix and general peritonitis, the mortality was high. There were 56 such cases with 43 recoveries and 13 deaths; average time after onset of condition was a little over 3 days. Only two patients died of intestinal obstruction, an important point.

Dr. Gibbon hesitated from these figures to take the ground that the Ochsner treatment ought not to be employed; in fact he did employ it, though not so extensively as has Dr. Deaver. His feeling was that all acute cases of appendicitis should be operated on practically at once. Where there is a diffuse peritonitis, evidenced by clinical symptoms, these cases should be operated upon if within 36 to 48 hours of onset. Of course, the patient's condition must be taken into consideration. Murphy's statistics are striking, he reporting 40 cases of acute perforative peritonitis with but one death, but these were all operated upon within the first 24 or 36 hours of onset. The crux of the matter with hospital surgeons is, what should be done with cases two or three days old? Here a selection must be made which must be the result of individual surgical experience. There is no

question that the mortality to-day is nothing like it was four or five years ago, largely due to the fact that the profession is now beginning to learn that purgation is unwarranted, and that surgeons are realizing that the less traumatism they make, the sooner they get out of the abdominal cavity and establish drainage and enteroclysis, the more chance will their patients have of recovery.

DR. EDWARD MARTIN said that Dr. Deaver implied by his remarks that the diagnosis of appendicitis can always be made. There are exceptions to this which he had seen on the part of most careful practitioners and also on the part of careful surgeons.

He had never seen a case of appendicitis so ill that operation was postponed or foregone because it was a desperate chance. That these cases of acute toxæmia occasionally will recover without operation, he acknowledged, but his experience had been that they recover more speedily after surgical intervention. Surgeons learned years ago from Dr. Deaver to operate the first minute, or the first hour, or the first day that the diagnosis was made, the single therapeutic indication in appendicitis always being operation. A good many lives have been saved by pursuing this policy, and the one which he advocates now constitutes a complicating and confusing addendum to a teaching which admitted of no misunderstanding.

With regard to the use of morphine, he heartily agreed with Dr. Deaver that it is to be avoided if possible, but he has the great bulk of surgeons, especially those who have had their abdomens opened, against him. All of them, even the most rabid antimorphinists, have become converted, when they themselves were suffering from post-operative pangs, and because of the good results from its use many surgeons have become adherents to its routine employment.

DR. JOHN H. JOPSON recalled a former pamphlet by Dr. Deaver entitled "Walled Off," in which he called attention to the danger of allowing appendiceal cases to reach the abscess stage. His early observations of patients treated by this method were made in Dr. Deaver's wards at the German Hospital.

Later in his own service at the Presbyterian Hospital, he was accustomed to seeing one of his colleagues treating patients on the Ochsner plan, and he saw many recoveries with and with-

out operation, some patients, indeed, refusing operation and leaving the hospital apparently well. He therefore had been adopting this plan of late in cases similar to those mentioned by Dr. Deaver, and with most satisfactory results.

DR. GEORGE G. ROSS commented upon Dr. Deaver's claim that peritonitis and appendicitis should be treated as separate conditions, no matter whether the peritonitis follows a perforated appendix or not. Dr. Deaver has always, and does to-day advocate, the taking out of the appendix. He believes that every appendix that has once been inflamed should come out, but also believes that judgment should be exercised as to the proper time at which to remove such an appendix. In peritonitis there is a different problem. Some cases never need operation, and do not come to it. For instance, consider the number of cases of pelvic peritonitis with more or less diffusion of fluid above the ileocecal line, due to pyosalpinx when both the peritonitis and the tubal infection subside. He knew of one case which had a violent diffuse peritonitis in which the tubes discharged themselves through the uterus. The woman subsequently became pregnant and bore a child at full term. Perforative peritonitis sooner or later will come to operation. There are some cases of appendicitis where the perforation occurs at the base of the appendix, or where the appendix is behind the cæcum with the tip in the pre-kidney fossa, when the infection is into the retroperitoneal space and directly into the lymphatic system; very few if any such cases recover. This space cannot be drained and the poison is taken up so readily and so rapidly that the patient has practically no chance of recovery. He felt more apprehension with an abscess behind the cæcum causing pressure necrosis than he did with the general peritoneal cases.

DR. JOHN H. GIBBON recalled a case seen by him some months ago. The patient was a girl 14 years of age, who was taken sick in Brooklyn and had been ill for three days before she was brought to the Jefferson Hospital. She had an abdomen tender, not distended, but rigid. She had been vomiting; had a very high leucocyte count, and fever. Appendicitis with general peritonitis seemed the more likely diagnosis, and appendicitis had been the original diagnosis made in Brooklyn. When he opened her abdomen he found a lot of bloody exudate and a gangrenous ovarian tumor with a twisted pedicle.

If he were to see another such case now, he did not believe he could differentiate it from one of acute appendicitis. Now had he pursued the plan of waiting for a few days in this case, he felt confident the patient would have died. After the operation she made a good recovery.

DR. GWILYM G. DAVIS remarked, with regard to the difficulty in diagnosis, that attention should be called to those cases in which the appendix lies in the pelvis, and as it becomes inflamed the pus passes up underneath the small intestines, works over the bladder, and up the left side; there is then an inflamed mass covered with small intestine; such a condition obscures the diagnosis and renders the treatment very difficult.

DR. GEORGE P. MULLER thought that in the consideration of the indications for this method of treatment too much attention is paid to the pathology of the disease. Some who had spoken had referred to the dangers of the posterior position, to the fact that perforations near the base are more dangerous than those near the tip, etc. It is impossible to diagnose the pathology of appendicitis with any degree of certainty until the abdomen has been opened, nor did he think that surgeons should accept a certain number of hours as the time limit indicating postponement of operation. What is needed is to find some method by which the resistance of the particular patient can be estimated, so as to determine whether his abdomen should be opened at once or whether delay would enable him to recover from the infection. Mikulicz was engaged upon this subject at the time of his death, and some effort has been made by the use of the so-called "vaccines" to increase resistance, but nothing promising has as yet been brought forward.

DR. JOHN B. DEEVER, in closing, said that the best working rule is that which gives the best results in the majority of cases. He did not wish for one instant for any one to believe that every case of appendicitis operated upon by him was diagnosed as such before operation. He had committed Dr. Gibbon's error in children as well as in adults, and there are other conditions to which he could also call attention, but his paper was not on the diagnosis but on the treatment of acute appendicitis.

In the first edition of his book on appendicitis he urged that every case of appendicitis, whether or not complicated by peritonitis, should be operated upon. He had now learned better.

The mortality at the German Hospital under his present treatment as compared with that under former methods is exceedingly gratifying, and he attributed the better results to the present method of treatment and to the better diagnostic powers gained through experience.

He quite agreed that the decision regarding whether or not to wait in cases of acute appendicitis should be made only by the surgeon.

With regard to Dr. Muller's remarks, he considered his suggestion an important one, for the resistance of the patient is the whole secret of this treatment. If he is not in a condition to withstand the toxæmia, then waiting will do no good, but harm. The bulk of patients, on the other hand, who get well without operation, assuming that the diagnosis is correct, may not have withstood the ordeal had surgical interference been instituted.

The question of the time of appearance of the peritonitis can only be calculated from the character of the pain. His rule is not to calculate the peritonitis from the onset of the disease, but from the onset of the most severe pain. In the majority of cases of acute appendicitis during the first hours the pain is general, then there is a history of sharp pain immediately followed by diffuse soreness of abdomen, etc., although this is not absolute.

Dr. Gibbon referred to the question of intestinal obstruction. Formerly the average number of cases of this condition at the German Hospital was about one in 50 or 60; one year they had 13 obstructions. Now in 1910 there were only two cases of intestinal obstruction, so that would refute the belief that the line of treatment recommended predisposes to obstruction.

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A Monthly Review of Surgical Science and Practice.

Edited by LEWIS STEPHEN PILCHER, M.D., LL.D., of New York.

WITH THE COLLABORATION OF

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OF PHILADELPHIA.

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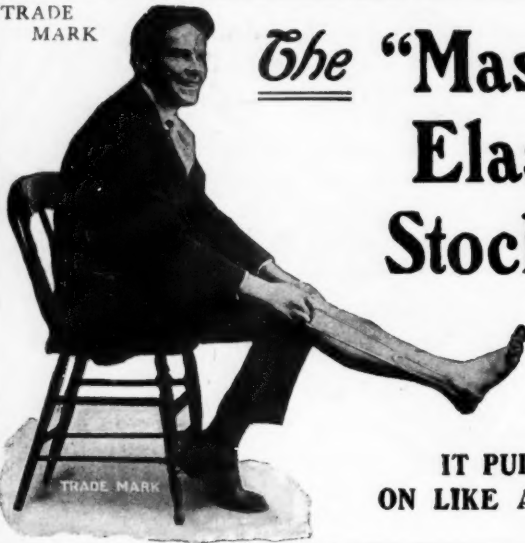
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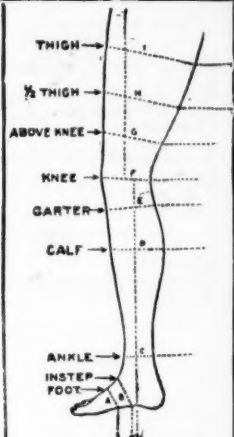
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CASE II.—Mrs. M. H., aged 21, married; multipara; occupation, housewife; came to me complaining of intense pain throughout the pelvic region, feeling of weight and bearing down sensation; bowels constipated and frequent micturition, having to void her urine from five to six times nightly, which was accompanied by severe burning and tenesmus. An examination disclosed a lacerated cervix with considerable inflammation of the endometrium. Treatment consisted of tampons of cotton and pure Glyco-Thymoline applied every second day with intra-uterine douches of a hot 25 per cent. solution of Glyco-Thymoline applied by means of Chamberlain's glass tube. This patient has been under my treatment for three months now and the laceration has almost healed, which I expect to be complete in two or three weeks when I will discharge her, the inflammation of the endometrium having long since disappeared.

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The effect is generally noted on the second or third day, in some cases later.

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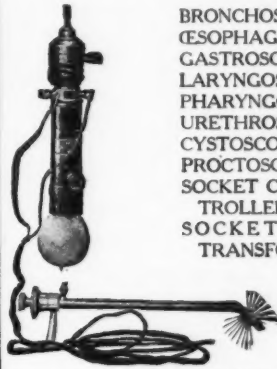
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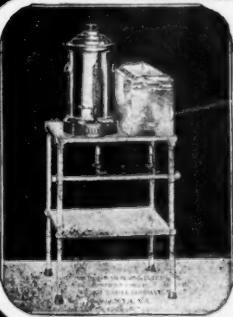


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The most recent of these is contained in a preliminary communication to the "Journal of Ophthalmology and Oto-Laryngology," Nov., 1910, by Dr. M. R. Dinkelspiel of Wilkesbarre, Pa., late Instructor in Ophthalmology and Assistant to Hospital Dispensary Staff,

Medico-Chirurgical College, Philadelphia. The author has obtained striking results in a series of consecutive cases of sympathetic ophthalmitis and other affections of the uveal tract by the administration per os of 40 to 80 grains of Urotropin daily in 10 grain doses. Under this treatment he has observed sympathetic ophthalmitis and iridocyclitis associated with hypopyon clear up without any other constitutional medication except an occasional purgative.

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